Title

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Journal
Women's Health Issues, 32(5)

ISSN
1049-3867

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Publication Date
2022-09-01

DOI
10.1016/j.whi.2022.03.003

Peer reviewed

Published in final edited form as:
Womens Health Issues. 2022 ; 32(5): 450–460. doi:10.1016/j.whi.2022.03.003.

Impacts of Medicaid expansion on health insurance and coverage transitions among women with or at risk for HIV in the U.S.

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Abstract

Background: As employment, financial status, and residential location change, people can gain, lose, or switch health insurance coverage, which may affect care access and health. Among Women's Interagency HIV Study participants with HIV and participants at risk for HIV attending semiannual visits at 10 U.S. sites, we examined whether the prevalence of coverage types and rates of coverage changes differed by HIV status and Medicaid expansion in their states of residence.

Methods: Geocoded addresses were merged with dates of Medicaid expansion to indicate, at each visit, whether women lived in Medicaid expansion states. Age-adjusted rate ratios (RRs) and rate differences of self-reported insurance changes were estimated by Poisson regression.

Results: From 2008–2018, 3,341 women (67% Black, 71% with HIV) contributed 43,329 visits at age <65 years (27% under Medicaid expansion). Women with and women without HIV differed in their proportions of visits at which no coverage (14% versus 19%, $p<0.001$) and Medicaid enrollment (61% versus 51%, $p<0.001$) were reported. Women in Medicaid expansion states reported no coverage and Medicaid enrollment at 4% and 69% of visits, respectively, compared to 20% and 53% of visits for those in non-expansion states. Women with HIV had a lower rate of losing coverage than those without HIV (RR: 0.81, 95% confidence interval [CI]: 0.70,0.95). Compared to non-expansion, Medicaid expansion was associated with lower coverage loss (RR: 0.62, 95% CI: 0.53,0.72) and greater coverage gain (RR: 2.32, 95% CI: 2.02,2.67), with no differences by HIV status.

Conclusions: As both women with HIV and women at high risk for HIV in Medicaid expansion states had lower coverage loss and greater coverage gain, Medicaid expansion throughout the U.S. should be expected to stabilize insurance for women and improve downstream health outcomes.

Keywords

Health insurance; HIV; Medicaid expansion; Women

Introduction

Implementation of Affordable Care Act (ACA) provisions in 2014 extended access to health insurance through Medicaid expansion and the creation of Health Insurance Exchanges (HIEs), a combination intended to increase the continuity of coverage (U.S. Centers for Medicare & Medicaid Services, 2012). Under Medicaid expansion, those at or below 138% of the federal poverty level (FPL) are eligible for Medicaid; those with incomes from 100%–400% of the FPL, without affordable or comprehensive employer-sponsored insurance, are eligible for subsidized coverage from HIEs (U.S. Centers for Medicare & Medicaid Services, 2021). However, not all states have elected to expand Medicaid, and in non-expansion states, individuals falling below 100% of the FPL become ineligible for HIE subsidies and are likely to be uninsured, as Medicaid enrollment criteria are stricter in non-expansion states (Brooks et al., 2020). Before the ACA, coverage disruptions were well documented among Medicaid beneficiaries (Sommers, 2009), and such discontinuities have been linked to deleterious effects on health service utilization and health outcomes (Banerjee, Ziegenfuss, & Shah, 2010). Common factors that contribute to Medicaid disruptions are income changes due to job loss or gain (Czajka, 2013), which can result in eligibility fluctuations from month to month, changes in categorical eligibility (e.g., loss of child custody) (Sommers, 2009), and administrative burdens (Kenney et al., 2017).

For people with HIV, coverage disruptions and transitions are potentially quite harmful because of the continuous antiretroviral therapy (ART) use required to maintain health, prevent the development of drug resistance, and reduce the likelihood of transmission to others. Health insurance, central to the consistent HIV care and medication access needed to maintain a life expectancy approximating that of the general population (Samji et al., 2013), is associated with beneficial outcomes including seeking timely medical care after diagnosis (Anthony et al., 2007), HIV viral load suppression (Furl et al., 2018) (which consequently eliminates transmission risk [Eisinger et al., 2019]), and decreased mortality (Bhattacharya, Goldman, & Sood, 2003). HIV treatment costs directly borne by patients (including those without insurance) can decrease adherence and care engagement, and the annual cost of ART rose by 34% between 2012 and 2018 (McCann et al., 2020). Coverage loss and transitions therefore may impose substantial and increasing financial and health burdens, even if patients are supported by the AIDS Drug Assistance Program (ADAP) or other safety nets.

Major provisions of the ACA were intended to facilitate continuous coverage, but differential implementation and timing of Medicaid expansion across states have resulted in the possibility of heterogeneous effects on coverage maintenance. An initial study suggested that transitions between different coverage types would become more common than they were prior to the ACA’s coverage reforms, estimating that more than 40% of general population adults eligible for Medicaid or subsidized HIE coverage would experience an eligibility change within 12 months, necessitating a switch in insurance (Sommers et al., 2014). The effects of Medicaid expansion on health insurance changes are still unfolding. While a survey in three states shortly after ACA implementation found little evidence of increased rates of coverage transitions in Medicaid expansion and non-expansion states (Sommers et al., 2016), more recent work noted fewer insurance disruptions in Medicaid expansion states than in non-expansion states (Goldman & Sommers, 2020; Gordon et al., 2019).

Although the impacts of Medicaid expansion on coverage transitions are becoming clearer in the general population, this relationship has not been investigated among people with HIV, those with HIV risk characteristics, or women in either subgroup. How patterns of coverage loss and gain differ by HIV status is also largely unknown. These gaps in the literature in the context of established relationships between insurance and health outcomes motivated our study objectives. In a study population of U.S. women with – or at high risk for – HIV infection, we examined whether insurance coverage distributions and rates of various types of coverage changes differed by HIV status and adoption of Medicaid expansion in their states of residence. We hypothesized that Medicaid expansion and HIV would each be associated with insurance coverage stabilization.

Methods

Study Population, Eligibility Criteria, and Follow-up

Our source of data was the Women's Interagency HIV Study (WIHS), an interval cohort of women with HIV and women at risk for HIV who were prospectively followed at 10 U.S. sites: Bronx and Brooklyn, NY, Chicago, IL, San Francisco, CA, and Washington, DC (sites active and conducting participant visits in 1994–2020); Los Angeles, CA (1994–2013); and Atlanta, GA, Birmingham, AL, Chapel Hill, NC, Jackson, MS, and Miami, FL (2013–2020) (Adimora et al., 2018). Women without HIV were generally eligible for the WIHS if they reported at the screening interview one or more specified HIV risk characteristics (e.g., injection drug use, use of crack, cocaine, heroin, or methamphetamine, sexually transmitted infection diagnosis, unprotected sex with three or more men, sex for drugs, money or shelter, sex with six or more men, sex with a man with HIV), in specified time periods preceding recruitment. Women's home addresses, requested at enrollment and once yearly beginning in 2013, were geocoded using ArcGIS (Esri, Redlands, CA), facilitating assignment of state/district/territory of residence (for clarity, we use the term "state" in this paper even when referring to the District of Columbia or Puerto Rico). As women not known to be HIV-seropositive were tested for HIV at each attended visit, participants' serostatus could change from negative to positive during the course of follow-up.

In this analysis, we included semiannual study visits by women <65 years of age at their latest visit between April 2008 and September 2018. The age cutoff at 65 years was selected because this is the Medicare eligibility age for the non-disabled, and most individuals over this age have stable Medicare coverage (in contrast to younger persons). Further, visits were only included if participants attended at least two visits through March 2019, and participants were censored after two or more consecutive missed visits. Women's final attended visits, including those in the October 2018 - March 2019 window, were considered only to allow for assessment of insurance coverage changes since the prior visit. The starting date of April 2008 was selected to include pre-Medicaid expansion visits (for participants residing in Medicaid expansion states) prior to its earliest adoption by any state, as well as to approximately equalize the number of eligible participant visits before and after that time point. This decision to incorporate visits from an earlier period of the WIHS was also made to maximize the precision of estimates and facilitate our aim of describing changes to and from specific coverage types.

Measures

We used two specifications of health insurance: binary (yes if medical coverage of any type) and five-level categorical. For the categorical variable, women were classified based on groups described previously by the Kaiser Family Foundation (Kates et al., 2014); categories were mutually exclusive and sequentially assigned, starting with Medicaid and followed by private (employer-provided or individually purchased, whether or not through HIEs), Medicare, other (e.g., city/county, TRICARE/CHAMPUS, Veteran's Administration, undetermined), and no insurance. Race (Black or not Black), annual household income (> or ≤$12,000), employment, HIV status, and ADAP participation were coded dichotomously. All data were self-reported.

Geocoded addresses were merged with dates of Medicaid expansion to create, for each woman-visit, a binary time-varying indicator of residence inside or outside a state where Medicaid expansion had been adopted. The timing of Medicaid expansion adoption in states was assigned according to dates tracked by the Kaiser Family Foundation and ranged from as early as January 1, 2014 to as late as July 2, 2018 (Kaiser Family Foundation, 2021). If the Medicaid expansion date fell after the start of a six-month WIHS visit window (e.g., January 1, 2014 in the October 1, 2013 – March 31, 2014 window), we made the conservative assumption that expansion occurred at the beginning of the subsequent WIHS visit (in this case, on April 1, 2014). While overall there were nine time points at which Medicaid expansion was adopted (Table 1 footnote), 26 states were classified as early expansion (by April 2014), seven as late expansion (no sooner than September 2014), and 19 as no Medicaid expansion (Figure 1).

Statistical Analysis

Log-linked Poisson regression models were used to generate 1) rates of various insurance change types, within each level of Medicaid expansion, HIV status, and cross-classified Medicaid expansion and HIV status, as well as 2) rate ratios (RRs) and rate differences (RDs) to compare groups. Models included offsets for time (assigning 0.5 years per visit, even though adjacent visits are not always attended exactly six months apart), and 95% confidence intervals (CIs) were based on robust standard errors that account for clustering by individual. Primary analyses evaluated change in overall coverage status (loss or gain) and any coverage change (loss, gain, or switch of type). Additionally, we separately evaluated coverage loss, coverage gain, and switch of coverage type. Secondary analyses examined loss of, gain of, and switch from specific coverage types. Adjusted models included only age, specified as a 4-knot restricted cubic spline, as including other potential covariates such as employment, annual household income, race, and HIV status did not substantially affect estimates. To convert rates to one-year cumulative incidences, we used the formula $C = 1 - e^{-rate}$ and then calculated number needed to treat (NNT) = $1 / (C_{\text{Medicaid expansion}} - C_{\text{Medicaid non-expansion}})$ (Suissa et al., 2012). To compare proportions, we used the chi-square test.

While there were minimal missing data overall (e.g., employment and annual household income were missing at approximately 5% and 9% of visits, respectively), any missing data, including participant state of residence, were filled by carrying forward their most recent non-missing values. For time points earlier than first geocoding, we carried backward the initial geocoded residence, assuming that women lived in the same state as they originally reported. If location remained missing after carrying values forward and backward, we assigned the state of the WIHS site for the specific study visit given that is possible for women to transfer sites during follow-up. The interval-based data collection in the WIHS precluded precise specificity on the timing of insurance coverage changes. In our primary analysis, we assumed that if there was a change in coverage (i.e., different reported insurance at adjacent visits), the change occurred under the Medicaid expansion adoption (or HIV) status of the first visit. In a sensitivity analysis, we evaluated the robustness of estimates by alternatively assuming that the change occurred under the Medicaid expansion adoption (or HIV) status of the second visit.

Consent to WIHS participation and contribution of data to research was obtained from all women, and relevant institutional review boards granted approval for the cohort and associated studies. SAS 9.4 (SAS Institute Inc., Cary, NC) was used for all analyses.

Results

In total, 3,341 women were included; 67% were Black, 31% had less than a high school education at WIHS enrollment, and 71% had HIV (4 women seroconverted during follow-up). Collectively, these women contributed 43,329 visits at a median age of 48 years (interquartile range, 41–54); of the visits, 85% were by women reporting health insurance and 27% were by women living under Medicaid expansion (Table 1). An annual household income ≤$12,000, employment, and ADAP participation were reported at 48%, 38%, and 17% of visits, respectively. During the study period, women lived in 35 states, and 96% of reported residences were in the same state as the contemporaneously attended WIHS site.

The proportions of visits by health insurance types, separately and jointly by Medicaid expansion adoption and HIV status, are depicted in Table 2. Coverage types differed for women living in states that had adopted Medicaid expansion and women living in non-expansion states, as well as for women with HIV and women without HIV (both $p<0.001$). Of note, those in Medicaid expansion states reported no coverage and Medicaid enrollment at 4% and 69% of visits, respectively, compared to 20% and 53% of visits for those in non-expansion states (both $p<0.001$). Similarly, women with HIV and women without HIV differed in their proportions of visits at which no coverage (14% versus 19%, $p<0.001$) and Medicaid enrollment (61% versus 51%, $p<0.001$) were reported. Consistent with these trends, women with HIV in Medicaid expansion states reported no coverage at the lowest proportion (4%) and Medicaid enrollment at the highest proportion (71%) of visits.

Rates, unadjusted and adjusted RRs and RDs, and their 95% CIs for five main types of coverage changes are detailed in Table 3 (primary analyses). In adjusted models, living in a Medicaid expansion state was associated with lower coverage loss (RR: 0.62, 95% CI: 0.53,0.72 and RD: −2.77, 95% CI: −3.56, −1.98) and greater coverage gain (RR: 2.32, 95% CI: 2.02,2.67 and RD: 55.49, 95% CI: 42.38,68.60). These relationships were evident regardless of HIV status – for women with HIV and women without HIV, respectively, RRs were 0.64 (95% CI: 0.53,0.76) and 0.56 (95% CI: 0.42,0.74) for coverage loss, and 2.43 (95% CI: 2.04,2.90) and 2.19 (95% CI: 1.75,2.73) for coverage gain. Considering that Medicaid expansion states had 1) a low relative rate of coverage loss during a high proportion of visits with reported Medicaid, and 2) a high relative rate of coverage gain during a very low proportion of reported uninsured visits, Medicaid expansion was associated with a net decrease in the rate of overall coverage status change (i.e., loss or gain), with an adjusted RR of 0.65 (95% CI: 0.57,0.75) and an adjusted RD of −4.77 (95% CI: 6.12, −3.43). Without regard to Medicaid expansion, women with HIV had a lower rate of coverage loss (RR: 0.81, 95% CI: 0.70,0.95 and RD: −1.40, 95% CI: −2.47, −0.03) but not a higher rate of coverage gain (RR: 1.03, 95% CI: 0.90,1.17 and RD: 1.35, 95% CI: −4.61,7.31) than women without HIV.

Estimates for loss of, gain of, and switch from specific coverage types are presented in the Supplemental Table (secondary analyses). Two notable contrasts were for Medicaid gain, with an adjusted RR of 3.29 (95% CI: 2.77,3.91) and an adjusted RD of 50.37 (95% CI: 38.59,62.15), and for Medicaid loss, with an adjusted RR of 0.84 (95% CI: 0.70,1.01) and an adjusted RD of −0.86 (95% CI: −1.73,0.01). For uninsured women, those with HIV living under Medicaid expansion had a greater rate of Medicaid gain (RR: 3.57; 95% CI: 2.80,4.55) than women without HIV in non-expansion states. In general, the sensitivity analysis yielded estimates close to those from the primary analysis. For example, when it was alternatively assumed that the insurance change occurred under the subsequent Medicaid expansion status, the estimates for coverage loss (RR: 0.60, 95% CI: 0.52,0.69 and RD: −2.96, 95% CI: −3.74, −2.19) and coverage gain (RR: 2.36, 95% CI: 2.07,2.69 and RD: 55.63, 95% CI: 43.56,67.69) were very similar to the above-cited results from the original approach.

Discussion

In a population of predominantly lower income U.S. women, we revealed a substantially lower rate of coverage loss (RR: 0.62, 95% CI: 0.53,0.72 and RD: −2.77, 95% CI: −3.56, −1.98) as well as a substantially higher rate of coverage gain (RR: 2.32, 95% CI: 2.02,2.67 and RD: 55.49, 95% CI: 42.38,68.60) among residents of states that had expanded Medicaid, compared to those living in non-expansion states. These findings are consistent with a recent study in which the unadjusted proportion of low-income women aged 19–64 who experienced a transition from Medicaid to no insurance in a given year was 1.5 percentage points lower for residents of Medicaid expansion states than others (Goldman & Sommers, 2020); our comparable crude Medicaid expansion versus non-expansion contrasts for Medicaid to loss were an RR of 0.68 (95% CI: 0.57,0.81) and an RD of −2.00 (95% CI: −2.85, −1.15), the latter converting to a very similar 1.9 percentage-point lower one-year cumulative incidence (risk). Our identified reductions in overall and Medicaid loss were also in line with analyses showing a lower probability of Medicaid disruption in Colorado (Medicaid expansion) than in Utah (non-expansion) (Gordon et al., 2019) and longer uninsured periods in the pre-ACA era than after its implementation (Vistnes & Cohen, 2018). The finding that women with HIV had a lower rate of coverage loss (compared to the HIV-seronegative group) likely reflects a combination of a stabilizing effect of consistent medical care because of their HIV, greater financial urgency to retain coverage because of prohibitive out-of-pocket costs associated with managing HIV, and access to case management through the Ryan White program, which also acts as the payer of last resort. Parity in coverage gain between the groups supports the suggestion that people with HIV may not enroll in Medicaid despite being eligible (Snider et al., 2014) and emphasizes that health systems should remain vigilant to identify uninsured HIV patients who would benefit from acquiring Medicaid or other coverage, given its downstream effects on increased ART access (Lillie-Blanton et al., 2010), better retention in care (Kay et al., 2020), and decreased transmission potential (Wood et al., 2018).

Comparing the distributions of coverage at visits under Medicaid expansion and non-expansion revealed a striking difference: Medicaid enrollment was 16 percentage points higher at Medicaid expansion visits and lack of health insurance was 16 percentage points higher at non-expansion visits, suggesting that, effectively, this substantial proportion of uninsured women was shifted onto Medicaid by expansion. This observation echoes 2019 data revealing that 15 of the 20 states with the highest proportions of residents without insurance were in non-expansion states, in addition to non-expansion states having nearly twice the proportion of uninsured residents as expansion states (15.5% versus 8.3%) (Tolbert, Orgera, & Damico, 2020); the even more extreme discrepancy observed in our study (19.6% versus 4.4%) is presumably due to the higher prevalence of low-income individuals in the WIHS (as compared to the general population) and greater Medicaid gains in this financially vulnerable group. There is broad evidence of higher overall and Medicaid coverage in expansion states (Guth, Garfield, & Rudowitz, 2017) and our research indicates that similar trends are evident specifically among both women with and women at high risk for HIV. Survey data from the Centers for Disease Control and Prevention Medical Monitoring Project through 2014 (Kates & Dawson, 2017) and 2018 (Dawson & Kates, 2020) showed greater overall and Medicaid coverage in expansion states among people with HIV, with the earlier report uniquely highlighting that these findings were consistent by gender; our work corroborates the observation among women with HIV using actual cohort data for the first time. We hypothesize that Medicaid expansion-associated increases in overall and Medicaid coverage, as well as reductions in loss rates and increases in gain rates, were primarily driven by the higher Medicaid eligibility income limits of not less than 138% of the FPL (Brooks et al., 2020); higher limits resulted in more people being able to sign up whether or not their income dropped, and fewer people becoming ineligible if their income grew.

Implications for Practice and/or Policy

The RDs estimated in our study translate to substantial public health impacts if applied on a population level. For example, the Medicaid expansion versus non-expansion RD of 55.49 for coverage gain converts to an NNT of 3.6, meaning that if 36 women were to live in expansion rather than non-expansion states, an additional 10 coverage gains would be expected in one year. There were approximately 13.2 million uninsured adults in non-expansion states in 2019 (U.S. Census Bureau, 2020); supposing the 2018 HIV prevalence of 444/100,000 in the South (AIDSVu, 2021) in this population (because Southern states are almost all non-expansion) and our HIV-specific NNT of 3.6, over 16,000 people with HIV would stand to gain coverage in a year. Quantifying the potential impacts of Medicaid expansion in terms of actual people who would benefit, as expressed by these impressive absolute numbers, is a strong argument supporting widespread adoption of the policy. More widespread adoption of Medicaid expansion could also boost the Ending the HIV Epidemic (EHE) initiative (Giroir, 2020) given that 18 of its 48 priority counties are in non-expansion states, our predicted Medicaid expansion-driven stabilization of coverage, insurance's relationship with viral load suppression (Furl et al., 2018), and the reality of Undetectable=Untransmissible (Eisinger, Dieffenbach, & Fauci, 2019). In particular, our finding of an increased coverage gain rate under Medicaid expansion for women with HIV suggests that expanding Medicaid would be a productive strategy for EHE locales – of its 7 priority states, 5 (containing the 18 priority counties) are in the South, where the prevalence of HIV is generally higher than elsewhere in the country, and those 5 states have not expanded Medicaid to date.

Limitations and Strengths

Limitations of the analysis likely had minimal impact on our findings. The low rate of any change of coverage (26.5/100 person-years, equivalent to women changing coverage an average of once every 3.8 years) supports the likelihood that multiple changes in a particular visit window, not captured in WIHS data collection, were rare and did not substantially affect results. Relatedly, results of the sensitivity analysis in which changes were moved forward by one visit were generally similar to those from the primary approach, indicating that the lack of specificity on change event timing also was unlikely to exert more than a minimal bias on estimates. Although we assumed that Medicaid expansion was implemented and effectuated instantaneously, this supposition was softened by the sensitivity analysis (which shifted changes to the subsequent interval) as well as by assigning all mid-interval adoptions of Medicaid expansion to the start of the following WIHS visit. We followed an algorithm to assign probable residential location in the absence of address information, which may have led to misclassification of state, and by extension, misclassification of the time-varying adoption of Medicaid expansion classification. This possibility too was likely minimal in its prevalence and effect, as historically 97% of geocoded addresses have been in the state of the WIHS site attended, and if woman did happen to live in a neighboring state, its Medicaid adoption status was typically similar (i.e., Southern states generally did not expand Medicaid, while Northeastern states did). Insurance may have been misclassified if women self-reported coverage incorrectly, though prior work has suggested that women are likely to correctly state when they are uninsured (Ludema et al., 2017). The analytic population also affects generalizability; including only women limits extrapolation to men, results from the HIV-seronegative participants (a unique group selected based on HIV risk characteristics) may not be directly transportable to HIV-seronegative women without such characteristics, and adjacency to health care via participation in a long-term cohort may have resulted in women having lower likelihoods of coverage instability than those not enrolled in a study. The study population included many women in New York and California, where specific programs and efficient preparations for Medicaid expansion likely resulted in pre-2014 environments similar to Medicaid expansion, as well as effective early implementation of Medicaid expansion. This may have resulted in stronger Medicaid expansion estimates than had a higher proportion of Medicaid expansion participants lived in other states.

Our analysis also features many notable strengths. The volume of observations (n=43,329) was sizeable; the assessment of insurance was frequent (semiannual), resulting in a high probability of capturing changes given that they occurred considerably less often overall; and the study population of individuals with HIV and individuals at high risk for HIV – and specifically women in these groups – are generally underrepresented in the existing literature on insurance stability and Medicaid expansion. The non-claims dataset was independent of health care utilization (i.e., it included individuals not in care) and insurance coverage (i.e., it was not limited to individuals with insurance or a particular type of coverage); these realities allowed for a rare assessment of various types of insurance transitions, which are typically difficult to study because relevant datasets tend to be restricted to a single payer or provider. Even all-payer datasets are often limited to only information on insured individuals, but this cohort uniquely included the uninsured person-time necessary to a undertake a comprehensive analysis of coverage changes. Unlike past reports focusing solely on Medicaid enrollees, we present novel information on the associations between Medicaid expansion and loss/gain of not just Medicaid (i.e., any coverage, along with specific non-Medicaid types); our finding of reduced loss of coverage in Medicaid expansion states is likely a consequence of individuals in the 100%–138% FPL range not cycling on and off private coverage in these areas but instead maintaining stable Medicaid coverage. In contrast, those in non-expansion states in the 100%−138% FPL range cannot access Medicaid and must instead seek private insurance, leading to challenges for this group in staying covered. Additionally, coverage losses occur when residents of non-expansion states fall into the 0%–100% FPL range (i.e., the "coverage gap" with no access to either Medicaid or subsidies). The finding of reduced loss of coverage under Medicaid expansion may also reflect the argument and demonstration by Sen and DeLeire (2019) that Medicaid expansion lowers premiums for those with private insurance, given that the majority of non-Medicaid insured women in our population had private coverage. This same phenomenon may also explain the revealed relationships between Medicaid expansion and lower loss and higher gain of private insurance (Supplemental Table).

Conclusions

Among U.S. women with HIV and women with HIV risk characteristics – medically and financially vulnerable populations with a heightened need for the risk protections afforded by health insurance – those living in Medicaid expansion states were more likely to have coverage than those living in non-expansion states. This discrepancy is likely a consequence of the association between Medicaid expansion and coverage stability, as indicated by a lower rate of coverage loss and a greater rate of coverage gain. Given the known relationships between coverage and improved health outcomes, the findings of our study support Medicaid expansion as an intervention to positively impact HIV wellness and prevention.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements:

The authors gratefully acknowledge the contributions of the study participants and dedication of the staff at the MWCCS sites. Andrew Edmonds had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Funding statement:

Data in this manuscript were collected by the Women's Interagency HIV Study (WIHS), now the MACS/WIHS Combined Cohort Study (MWCCS). The contents of this publication are solely the responsibility of the authors and do not represent the official views of the National Institutes of Health (NIH). MWCCS (Principal Investigators): Atlanta CRS (Ighovwerha Ofotokun, Anandi Sheth, and Gina Wingood), U01-HL146241; Baltimore CRS (Todd Brown and Joseph Margolick), U01-HL146201; Bronx CRS (Kathryn Anastos and Anjali Sharma), U01-HL146204; Brooklyn CRS (Deborah Gustafson and Tracey Wilson), U01-HL146202; Data Analysis and Coordination Center (Gypsyamber D'Souza, Stephen Gange and Elizabeth Golub), U01-HL146193; Chicago-Cook County CRS (Mardge Cohen and Audrey French), U01-HL146245; Chicago-Northwestern CRS (Steven Wolinsky), U01-HL146240; Northern California CRS (Bradley Aouizerat, Jennifer Price, and Phyllis Tien), U01-HL146242; Los Angeles CRS (Roger Detels and Matthew Mimiaga), U01-HL146333; Metropolitan Washington CRS (Seble Kassaye and Daniel Merenstein), U01-HL146205; Miami CRS (Maria Alcaide, Margaret Fischl, and Deborah

Jones), U01-HL146203; Pittsburgh CRS (Jeremy Martinson and Charles Rinaldo), U01-HL146208; UAB-MS CRS (Mirjam-Colette Kempf, Jodie Dionne-Odom, and Deborah Konkle-Parker), U01-HL146192; UNC CRS (Adaora Adimora), U01-HL146194. The MWCCS is funded primarily by the National Heart, Lung, and Blood Institute (NHLBI), with additional co-funding from the Eunice Kennedy Shriver National Institute Of Child Health & Human Development (NICHD), National Institute On Aging (NIA), National Institute Of Dental & Craniofacial Research (NIDCR), National Institute Of Allergy And Infectious Diseases (NIAID), National Institute Of Neurological Disorders And Stroke (NINDS), National Institute Of Mental Health (NIMH), National Institute On Drug Abuse (NIDA), National Institute Of Nursing Research (NINR), National Cancer Institute (NCI), National Institute on Alcohol Abuse and Alcoholism (NIAAA), National Institute on Deafness and Other Communication Disorders (NIDCD), National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), National Institute on Minority Health and Health Disparities (NIMHD), and in coordination and alignment with the research priorities of the National Institutes of Health, Office of AIDS Research (OAR). MWCCS data collection is also supported by UL1-TR000004 (UCSF CTSA), UL1-TR003098 (JHU ICTR), UL1-TR001881 (UCLA CTSI), P30-AI-050409 (Atlanta CFAR), P30-AI-073961 (Miami CFAR), P30-AI-050410 (UNC CFAR), P30-AI-027767 (UAB CFAR), and P30-MH-116867 (Miami CHARM). Adaora A. Adimora has received consulting fees from Merck, Viiv, and Gilead. Merck and Gilead have provided her institution with funding for her research.

Biography

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Dr. Cohen is an internal medicine physician at John H. Stroger, Jr. Hospital of Cook County. She founded the Women's and Children HIV Program in 1989, and since then has cared for and participated in research related to women with HIV.

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Dr. Johnson is a Professor in the Department of Medicine at the University of California, San Francisco. His research focuses on multi-level factors affecting engagement in treatment and prevention in the context of HIV and other health conditions.

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Dr. Adimora is the Sarah Graham Kenan Distinguished Professor of Medicine, and a Professor of Epidemiology, at the University of North Carolina at Chapel Hill. Her research focuses on the epidemiology of sexually transmitted diseases and HIV in women and minorities.

Glossary

ACA	Affordable Care Act
ADAP	AIDS Drug Assistance Program
ART	antiretroviral therapy
CI	confidence interval
FPL	federal poverty level
HIE	Health Insurance Exchange
NNT	number needed to treat
RD	rate difference
RR	rate ratio
WIHS	Women's Interagency HIV Study

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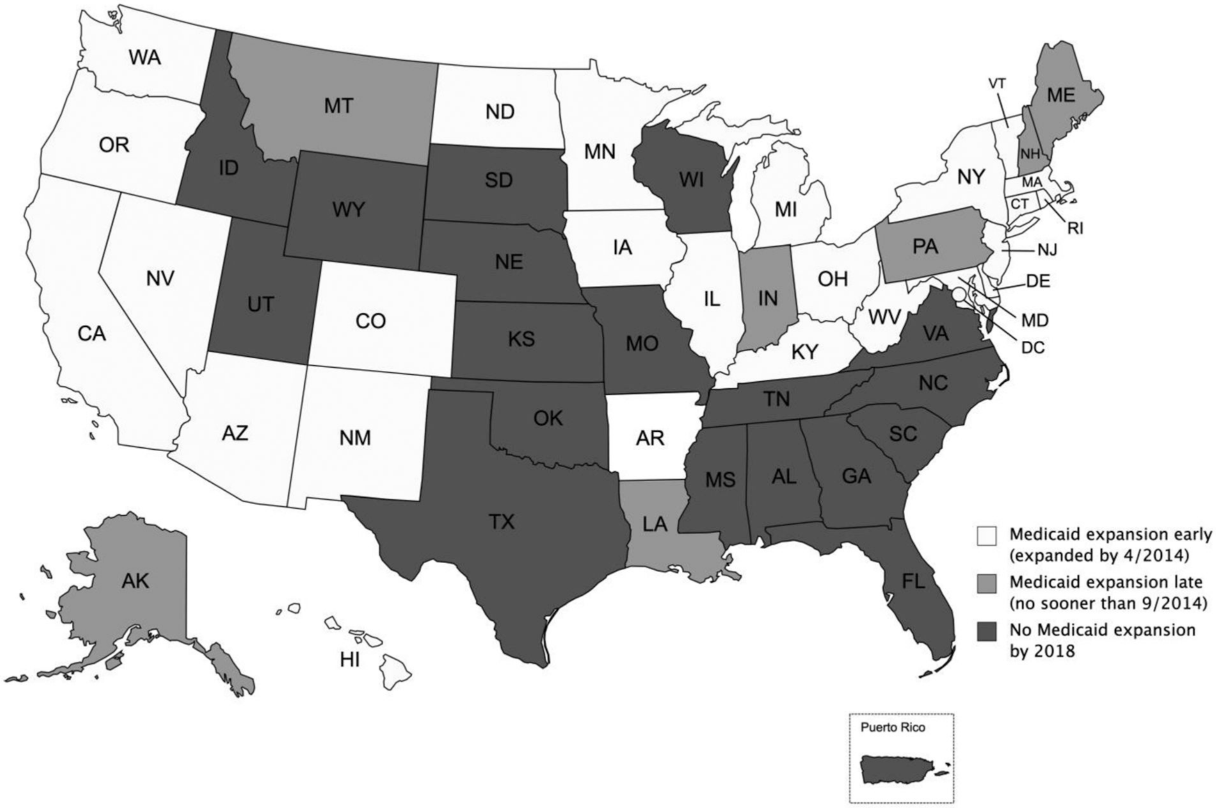

Figure 1.

Timing of adoption of Medicaid expansion, 2014–2018. (map)

Table 1.

Characteristics at 43,329 visits of 3,341 Women's Interagency HIV Study participants followed for changes in health insurance coverage, 2008–2018.

Age, years	48 (41–54)
HIV	30,457 (70)
Black race	29,052 (67)
Less than high school education *	15,026 (35)
Annual household income ≤$12,000 *	20,874 (48)
Employed *	16,643 (38)
Health insurance	36,617 (85)
Medicaid	*24,937 (68)*
Private	*9,359 (26)*
Medicare	*1,251 (3)*
Other	*1,070 (3)*
AIDS Drug Assistance Program participation	7,430 (17)
Residence in Medicaid expansion state #	11,671 (27)

All values are n (%) or median (interquartile range).

* Percentages calculated from visits with non-missing values.

As of April 2014 for residences in AZ, AR, CA, CO, CT, DE, DC, HI, IL, IA, KY, MD, MA, MI, MN, MO, NE, NJ, NM, NY, OH, OR, RI, VT, WA, WV; as of October 2014 for residences in NH; as of April 2015 for residences in AK, IN, PA; as of October 2015 for residences in MT; as of April 2016 for residences in LA; as of October 2018 for residences in ME; never for residences in AL, FL, GA, ID, KS, MO, MS, NB, NC, OK, PR, SC, SD, TN, TX, UT, VA, WI, WY.

Table 2.

Health insurance coverage types, separately and jointly by Medicaid expansion adoption and HIV status, at 43,329 visits of 3,341 Women's Interagency HIV Study participants followed for changes in health insurance coverage, 2008–2018.

	ME+	ME−	*p*	HIV+	HIV−	*p*	ME+ HIV+	ME+ HIV−	ME− HIV+	ME− HIV−	*p*
Total [*]	11,671	31,658	<0.001	30,457	12,872	<0.001	8,056	3,615	22,401	9,257	<0.001
Medicaid [#]	8,012 (69)	16,925 (53)	<0.001	18,427 (61)	6,510 (51)	<0.001	5,739 (71)	2,273 (63)	12,688 (57)	4,237 (46)	<0.001
Private [#]	2,668 (23)	6,691 (21)	<0.001	6,178 (20)	3,181 (25)	<0.001	1,730 (21)	938 (26)	4,448 (20)	2,243 (24)	<0.001
Medicare [#]	227 (2)	1,024 (3)	<0.001	980 (3)	271 (2)	<0.001	152 (2)	75 (2)	828 (4)	196 (2)	<0.001
Other [#]	245 (2)	825 (3)	0.003	625 (2)	445 (2)	<0.001	145 (2)	100 (3)	480 (2)	345 (4)	<0.001
No coverage [#]	519 (4)	6,193 (20)	<0.001	4,247 (14)	2,465 (19)	<0.001	290 (4)	229 (6)	3,957 (18)	2,236 (24)	<0.001

ME, Medicaid expansion. All values are n (%). "+" indicates the presence of Medicaid expansion (or HIV) and "−" indicates the absence of Medicaid expansion (or HIV).

[*] *p*-values are from chi-square test of heterogeneity, i.e., to assess whether groups differ in their distributions of coverage types.

[#] *p*-values from chi-square test, e.g., comparing proportions of visits with 1) Medicaid reported and 2) Medicaid not reported.

Table 3.

Impacts of adoption of Medicaid expansion in state of residence and HIV status, separately and jointly, on rates of five types of health insurance coverage changes among 3,341 Women's Interagency HIV Study participants, 2008–2018.

		Events	Visits	Rate	95% CI	RR	95% CI	aRR	95% CI	RD	95% CI	aRD	95% CI
Loss of coverage	Total	1,255	36,617	6.9	12.3,13.8								
	ME+ HIV+	153	7,766	3.9	3.3,4.6	0.37	0.30,0.46	0.49	0.40,0.61	−6.63	−8.10,−5.16	−4.43	−5.84,−3.03
	ME+ HIV−	81	3,386	4.8	3.7,6.2	0.45	0.35,0.59	0.56	0.42,0.74	−5.78	−7.43,−4.13	−3.83	−5.44,−2.22
	ME− HIV+	650	18,444	7.0	6.4,7.7	0.67	0.57,0.78	0.77	0.66,0.91	−3.52	−4.99,−2.05	−1.99	−3.31,−0.67
	ME− HIV−	371	7,021	10.6	9.3,12.0	1.		1.		0.		0.	
	ME+	234	11,152	4.2	3.6,4.8	0.52	0.45,0.61	0.62	0.53,0.72	−3.82	−4.59,−3.06	−2.77	−3.56,−1.98
	ME−	1,021	25,465	8.0	7.4,8.6	1.		1.		0.		0.	
	HIV+	803	26,210	6.1	5.6,6.7	0.71	0.61,0.82	0.81	0.70,0.95	−2.56	−3.73,−1.38	−1.40	−2.47,−0.03
	HIV−	452	10,407	8.7	7.7,9.8	1.		1.		0.		0.	
Gain of coverage	Total	1,566	6,712	46.7	43.9,46.9								
	ME+ HIV+	154	290	106.2	89.0,126.8	2.50	2.03,3.07	2.52	2.07,3.08	63.72	44.38,83.06	62.45	44.41,80.50
	ME+ HIV−	101	229	88.2	70.2,110.8	2.08	1.65,2.61	2.19	1.75,2.73	45.72	25.20,65.25	48.63	29.53,67.73
	ME− HIV+	836	3,957	42.3	39.0,45.8	0.99	0.87,1.14	1.04	0.91,1.19	−0.23	−5.88,5.41	1.51	−4.11,7.13
	ME− HIV−	475	2,236	42.5	38.2,47.3	1.		1.		0.		0.	
	ME+	255	519	98.3	85.4,113.1	2.32	2.01,2.67	2.32	2.02,2.67	55.93	42.22,69.42	55.49	42.38,68.60
	ME−	1,311	6,193	42.3	39.7,45.1	1.		1.		0.		0.	
	HIV+	990	4,247	46.6	43.2,50.3	1.00	0.88,1.13	1.03	0.90,1.17	−0.11	−6.10,5.88	1.35	−4.61,7.31
	HIV−	576	2,465	46.7	42.2,51.8	1.		1.		0.		0.	
Change in overall coverage status (loss or gain)	Total	2,821	43,329	13.0	12.3,13.8								
	ME+ HIV+	307	8,056	7.6	6.5,8.9	0.42	0.35,0.50	0.51	0.43,0.62	−10.42	−12.79,−8.53	−7.84	−9.97,−5.70
	ME+ HIV−	182	3,615	10.1	8.0,12.7	0.55	0.44,0.69	0.64	0.51,0.81	−8.21	−10.79,−5.63	−5.72	−8.35,−3.08
	ME− HIV+	1,486	22,401	13.3	12.3,14.3	0.73	0.64,0.82	0.80	0.70,0.90	−5.01	−7.05,−2.97	−3.28	−5.16,−1.39
	ME− HIV−	846	9,257	18.3	16.6,20.2	1.		1.		0.		0.	
	ME+	489	11,671	8.4	7.4,9.5	0.57	0.50,0.65	0.65	0.57,0.75	−6.35	−7.60,−5.10	−4.77	−6.12,−3.43
	ME−	2,332	31,658	14.7	13.9,15.6	1.		1.		0.		0.	
	HIV+	1,793	30,457	11.8	11.2,12.6	0.74	0.65,0.83	0.81	0.72,0.92	−4.20	−5.98,−2.41	−2.73	−4.39,−1.06
	HIV−	1,028	12,872	16.0	14.5,17.6	1.		1.		0.		0.	

		Events	Visits	Rate	95% CI	RR	95% CI	aRR	95% CI	RD	95% CI	aRD	95% CI
Switch of coverage type	Total	2,911	36,617	15.9	15.0,16.9								
	ME+ HIV+	604	7,766	15.6	13.8,17.6	0.90	0.76,1.06	0.89	0.74,1.05	−1.82	−4.57,0.92	−2.00	−4.82,0.82
	ME+ HIV−	309	3,386	18.3	15.6,21.3	1.05	0.88,1.25	1.04	0.87,1.25	0.88	−2.29,4.04	0.76	−2.43,3.94
	ME− HIV+	1,388	18,444	15.1	13.9,16.3	0.87	0.75,1.00	0.87	0.75,1.00	−2.33	−4.64,−0.01	−2.31	−4.65,0.03
	ME− HIV−	610	7,021	17.4	15.5,19.5	1.		1.		0.		0.	
	ME+	913	11,152	16.4	14.9,18.0	1.04	0.94,1.16	1.04	0.93,1.16	0.68	−1.02,2.38	0.58	−1.17,2.34
	ME−	1,998	25,465	15.7	14.7,16.7	1.		1.		0.		0.	
	HIV+	1,992	26,210	15.2	14.1,16.3	0.86	0.76,0.97	0.86	0.76,0.97	−2.46	−4.52,−0.40	−2.48	−4.56,−0.40
	HIV−	919	10,407	17.7	16.0,19.5	1.		1.		0.		0.	
Any change in coverage (loss, gain, switch of type)	Total	5,732	43,329	26.5	25.4,27.6								
	ME+ HIV+	911	8,056	22.6	20.5,24.9	0.72	0.64,0.81	0.78	0.69,0.88	−8.84	−12.00,−5.68	−6.67	−9.88,−3.45
	ME+ HIV−	491	3,615	27.2	23.9,30.9	0.86	0.75,0.99	0.92	0.80,1.05	−4.29	−8.07,−0.52	−2.41	−6.25,1.44
	ME− HIV+	2,874	22,401	25.7	24.3,27.1	0.82	0.75,0.89	0.85	0.78,0.93	−5.80	−8.47,−3.13	−4.46	−7.06,−1.85
	ME− HIV−	1,456	9,257	31.5	29.3,33.8	1.		1.		0.		0.	
	ME+	1,402	11,671	24.0	22.2,26.0	0.88	0.81,0.95	0.92	0.85,1.00	−3.33	−5.27,−1.39	−2.06	−4.10,−0.02
	ME−	4,330	31,658	27.4	26.2,28.6	1.		1.		0.		0.	
	HIV+	3,785	30,457	24.9	23.6,26.2	0.82	0.75,0.90	0.85	0.78,0.93	−5.40	−7.84,−2.95	−4.30	−6.71,−1.89
	HIV−	1,947	12,872	30.3	28.2,32.4	1.		1.		0.		0.	

aRD, adjusted rate difference; aRR, adjusted rate ratio; CI, confidence interval; ME, Medicaid expansion; RD, rate difference; RR, rate ratio. Rates and RDs are per 100 person-years. Log-linked Poisson regression models with offsets for time were used to generate RRs and RDs, and 95% CIs were based on robust standard errors to account for clustering by individual. Adjusted models included only age, as other potential covariates did not substantially affect estimates.