Certified Community Behavioral Health Clinics Demonstration Program: Report to Congress, 2024

Prepared for

The Office of the Assistant Secretary for Planning and Evaluation (ASPE) at the U.S. Department of Health & Human Services

by

Mathematica Policy Research

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Office of the Assistant Secretary for Planning and Evaluation

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CERTIFIED COMMUNITY BEHAVIORAL HEALTH CLINICS DEMONSTRATION PROGRAM: REPORT TO CONGRESS, 2024

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Contents

Exhibits

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Abstract

Section 223 of the Protecting Access to Medicare Act of 2014 (PAMA; Public Law 113-93) authorized the Certified Community Behavioral Health Clinic (CCBHC) demonstration, which allows states to test an innovative evidence-based strategy for delivering and reimbursing a comprehensive array of services provided in community behavioral health clinics. The demonstration aims to improve the availability, quality, and outcomes of outpatient services and also provides coordinated care that addresses both behavioral and physical health conditions provided in these clinics. The demonstration requires participating states to reimburse CCBHC services through a Medicaid prospective payment system (PPS) intended to cover the expected costs of CCBHC services for Medicaid beneficiaries. In 2016, the U.S. Department of Health and Human Services (HHS) selected 8 states to participate in the demonstration (Minnesota, Missouri, Nevada, New Jersey, New York, Oklahoma, Oregon, and Pennsylvania). The demonstration was originally authorized for two years, but Congress has extended it multiple times and it is currently authorized in the original states through September 2025. In August 2020, HHS announced that Kentucky and Michigan would begin participating in the demonstration as a result of the Coronavirus Aid, Relief, and Economic Security Act (CARES Act; Public Law 116-136) which allowed HHS to add two states from among the original 24 planning grant states. The Bipartisan Safer Communities Act (Public Law 117-159), enacted in June 2022, funded additional planning grants and authorized all states who received a planning grant to apply to participate in the demonstration beginning in 2024. Beginning July 1, 2024, and every two years thereafter, HHS may select up to 10 additional states to participate in the demonstration. In 2024, HHS welcomed 10 new states into the demonstration.

PAMA mandates that the HHS Secretary submit an annual report to Congress that assesses: (1) access to community-based mental health services under Medicaid; (2) the quality and scope of services provided by CCBHCs; and (3) the impact of the demonstration on federal and state costs of a full range of mental health services. This report describes findings related to the PAMA topics of access to care, quality of care, and the demonstration's impact on costs. The report draws on Medicaid data, quality measure data, and interviews with state officials.

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Executive Summary

Section 223 of the Protecting Access to Medicare Act of 2014 (PAMA; Public Law 113-93) authorized the Certified Community Behavioral Health Clinic (CCBHC) demonstration, which allows states to test an innovative evidence-based strategy for delivering and reimbursing a comprehensive array of services provided in community behavioral health clinics. The demonstration aims to improve the availability, quality, and outcomes of outpatient services provided in these clinics and also provides coordinated care that addresses both behavioral and physical health conditions. CCBHCs must offer nine types of services to all people who seek care, including people with serious mental illness, serious emotional disturbance, and substance use disorders (SUDs).[1] Demonstration states have some flexibility, however, to tailor these services to align with their Medicaid state plans and other regulations and to meet the needs of the communities they serve based, in part, on community needs assessments. Services must be person- and family- centered, trauma informed, and recovery oriented and may be delivered through telehealth and telemedicine. CCBHCs can have formal signed agreements with Designated Collaborating Organizations (DCOs) to provide demonstration services to CCBHC clients, but services provided through a DCO must meet CCBHC standards. Even if CCBHCs do not engage DCOs, the CCBHCs must maintain relationships with a range of health and social service providers to facilitate referrals and coordinate care. They must also offer services during accessible hours (including evenings and weekends) and in convenient locations (for example, by providing services in clients' homes and elsewhere in the community) and ensure timely access to crisis services 24 hours a day and seven days a week.

The demonstration requires participating states to reimburse CCBHC services through a Medicaid prospective payment system (PPS). The PPS is intended to cover the expected costs of CCBHC services for Medicaid beneficiaries and provide CCBHCs with a flexible and stable source of funding. States select one of four PPS models to reimburse all demonstration CCBHCs in the state. Two options offer a fixed daily payment for each day a Medicaid beneficiary receives demonstration services (PPS-1 and PPS-3), and two offer a fixed monthly payment for each month in which a Medicaid beneficiary receives demonstration services (PPS-2 and PPS-4).[2] After each demonstration year (DY), states must report measures that assess the quality of care provided to CCBHC clients. Quality measure reporting provides CCBHCs and state officials with standardized metrics to monitor the quality of care and inform quality improvement efforts. PPS-1 and PPS-3 states have the option to provide CCBHCs with quality bonus payments (QBPs) based on their performance on quality measures. PPS-2 and PPS-4 states must provide QBPs.

In October 2015, the U.S. Department of Health and Human Services (HHS) awarded planning grants to 24 states to begin certifying clinics to become CCBHCs, establish their PPS, and develop the infrastructure to support the demonstration. To support the first phase of the demonstration, HHS developed criteria (as

[1] These services include: (1) crisis mental health services; (2) screening, assessment, and diagnosis; (3) patient-centered treatment planning; (4) outpatient mental health and substance use services; (5) outpatient clinic primary care screening and monitoring; (6) targeted case management; (7) psychiatric rehabilitation services; (8) peer supports, peer counselor services, and family/caregiver supports; and (9) intensive, community-based mental health care for members of the armed forces and veterans.

[2] PPS-3 and PPS-4 include the option of setting a separate special crisis services rate for several categories of crisis services (CMS 2024). PPS-3 and PPS-4 were introduced as options for states to use starting in 2024. Before this, states could select PPS-1 or PPS-2.

required by PAMA) for certifying CCBHCs in six areas (SAMHSA 2016a).[3] The criteria provide a framework for certifying CCBHCs, but states can exercise some discretion in applying the criteria to support implementation of the CCBHC model in their local context. The certification criteria require CCBHCs to provide accessible care, including 24-hour crisis management services; engage people quickly through prompt intake services; and provide treatment for all adults, children, and adolescents regardless of their ability to pay or place of residence.[4]

As of August 2024, 20 states have been selected to participate in the demonstration. In December 2016, HHS selected eight of the 24 planning grant states to participate in the demonstration (Minnesota, Missouri, Nevada, New Jersey, New York, Oklahoma, Oregon, and Pennsylvania). [5] The demonstration was originally authorized for two years and scheduled to end in July 2019, but Congress has extended it multiple times (Office of the Assistant Secretary for Planning and Evaluation 2021). It is currently authorized through September 2025 for the original states. In August 2020, HHS announced that Kentucky and Michigan would begin participating in the demonstration as a result of the Coronavirus Aid, Relief, and Economic Security Act (CARES Act; Public Law 116-136) which allowed HHS to add two states from among the original 24 planning grant states. The Bipartisan Safer Communities Act (BSCA Act, Public Law 117-159), enacted in June 2022, funded additional planning grants and authorized all states who received a planning grant to apply to participate in the demonstration beginning in 2024.[6] It also extended the demonstration period for Michigan and Kentucky by four years, for a total of six years. Beginning July 1, 2024, and every two years thereafter, HHS may select up to 10 additional states to participate in the demonstration for a period of four years. In March 2023, HHS awarded planning grants to 15 states to develop proposals to participate in the demonstration. HHS will award additional planning grants to states in Federal Fiscal Year (FFY) 2025. In June 2024, HHS announced it would welcome 10 additional states to participate in the demonstration.[7]

PAMA mandates that HHS submit annual Reports to Congress that assess: (1) access to community-based mental health services under Medicaid in the area or areas of a state targeted by a demonstration program as compared to other areas of the state, (2) the quality and scope of services provided by CCBHCs as compared to community-based mental health services provided in states not participating in a demonstration program and in areas of a demonstration state that are not participating in the

[3] These areas include: (1) staffing, (2) availability and accessibility of services, (3) care coordination, (4) scope of services, (5) quality and reporting, and (6) organizational authority.

[4] HHS published updated certification criteria in March 2023 (SAMHSA 2023).

[5] Since the launch of the demonstration in 2017, two of the original states ended their participation. Pennsylvania chose not to continue participating after the first two years. Nevada ended its participation in the demonstration on July 1, 2023. Both states are continuing to fund CCBHCs under separate Medicaid authorities. Additionally, Minnesota briefly ended its participation on December 31, 2022, but rejoined the demonstration on July 1, 2023.

[6] States must have received a planning grant at any time since 2015 in order to apply to participate in the Demonstration.

[7] This includes Alabama, Illinois, Indiana, Iowa, Kansas, Maine, New Hampshire, New Mexico, Rhode Island and Vermont. Demonstrations in these states are expected to begin between July 2024 and July 2025. See: https://www.hhs.gov/about/news/2024/06/04/biden-harris-administration-expands-access-mental-health-substance-use-services-addition-10-new-states-ccbhc-medicaid-demonstration-program.html

demonstration, and (3) the impact of the demonstration on the federal and state costs of a full range of mental health services (including inpatient, emergency, and ambulatory services).

In September 2016, the Office of the Assistant Secretary for Planning and Evaluation (ASPE) contracted with Mathematica and its subcontractor, the RAND Corporation, to evaluate the demonstration's implementation and impacts and to provide information for HHS's Reports to Congress. The evaluation included the eight original demonstration states and covered the two-year period for which the demonstration was initially authorized (Brown et al. 2021). As the demonstration continued in the original states and expanded to others, ASPE contracted with Mathematica and the RAND Corporation in 2021 and again with Mathematica, the RAND Corporation, and Advocates for Human Potential in late 2023 to further evaluate the demonstration. This eighth annual report to Congress describes findings related to the PAMA topics of access to care, quality of care, and the demonstration's impact on costs. The report includes findings from the nine remaining states with demonstration start dates before July 2024. The report draws on interviews with state officials; quality measure data; and an analysis of the impacts of the demonstration on service use, quality of care, and costs using Medicaid data in three demonstration states (Minnesota, Nevada, and Oklahoma).[8]

A. Access to care

The number of CCBHCs across demonstration states has expanded over time, and states plan to add more clinics in the future. As of May 2024, four of the eight demonstration states included in this report certified additional CCBHCs in response to guidance from HHS allowing these states to add new CCBHCs to their demonstration programs, expanding the number of demonstration CCBHCs from 77 in June 2023 to 106 in May 2024. Four demonstration states were exploring opportunities to certify additional demonstration clinics, and two others may expand the number of CCBHCs through other Medicaid options. Two other states did not have plans to add demonstration clinics because the demonstration is already operating statewide.

The number of people CCBHCs served each year has increased steadily over time in the original demonstration states. CCBHCs in Kentucky and Michigan served more people in the first DY than these states anticipated. Across the original demonstration states, the unduplicated number of people served by CCBHCs increased from 286,089 in DY1 to 340,334 in DY5.[9] With few exceptions, client age, gender, race and ethnicity, and insurance status were consistent across years in the original demonstration states. CCBHCs in Kentucky served 79,967 people (46 percent more than anticipated) and Michigan served 82,280 (27 percent more than anticipated) people in their first DY. The characteristics of people CCBHCs served generally aligned with the expectations of state officials, and most states reported reaching new and underserved populations. State officials attributed growth in the number of people CCBHCs served to efforts to engage new people and specific populations in care. For example, Oklahoma officials reported CCBHCs have been able to increase the number of people in their highest-need population, including people who have high rates of hospitalizations, ED visits, and use of crisis services.

[8] We selected three states with the highest-quality Medicaid enrollment, claims, and encounter data; strong comparison groups; and several years of experience implementing the CCBHC demonstration model for the impact analyses.

[9] The number of clinics for which data are available varies from year to year because some clinics were not certified continuously, or data were missing for some clinics in some years.

States credited certain features of the CCBHC model as helping increase the number of people CCBHCs serve, including the PPS and certification requirements for access to care, services, and community partnerships. Officials in a few states described some populations as more difficult to engage in CCBHC services than others, however, they most often reported challenges engaging children and adolescents, veterans, and older adults.

The introduction of the CCBHC model affected the use of services differently across the three states included in impact analyses (Minnesota, Oklahoma, and Nevada). In these states, we assessed changes in Medicaid service use (including hospitalizations, emergency department [ED] visits, and ambulatory visits) among beneficiaries who received care from CCBHCs relative to beneficiaries with similar demographic and diagnostic characteristics who received care from other (non-certified) behavioral health organizations in the same state, representing care as usual.

- In Minnesota, the demonstration did not impact hospitalization rates but was associated with higher rates of ED visits (a three percent increase in the percentage of beneficiaries with any ED visit, and an average increase of 87 all-cause ED visits per 1,000 beneficiaries per year [$p < 0.01$ for both comparisons]). Some of this increase, however, might have been because of higher rates of COVID-19-related service use among people who received care from CCBHCs relative to the comparison group during the demonstration period. Specifically, CCBHC clients had more inpatient hospital stays and outpatient ED visits for COVID-19 infections during the demonstration period (after ensuring the treatment and comparison groups were well matched) than the comparison group. The demonstration was also associated with increased behavioral health–related ambulatory visits (a 4 percent increase) ($p < 0.01$) and decreased physical health–related ambulatory visits (a 6 percent decrease) ($p<0.01$).
- In Nevada, the demonstration had favorable impacts on all-cause hospitalizations (a decrease of 23 percent for the full population) and there was some evidence of decreasing ED visits among people who received care from CCBHCs relative to the comparison group. The demonstration was also associated with increased all-cause ambulatory visits (a 15 percent increase) ($p < 0.01$), driven by an increase in behavioral health–related ambulatory visits.
- In Oklahoma, the demonstration had favorable impacts on hospitalization rates, but only for adults and people with SUD (a 15 and 19 percent decrease in all-cause hospitalizations per 1,000 beneficiaries per year, respectively, $p = 0.01$ and $p = 0.02$). Children and adolescents who received care from CCBHCs had increased all-cause hospitalization rates relative to the comparison group (a 20 percent increase, reflecting an average increase of 24 all-cause hospitalizations per 1,000 beneficiaries per year, $p = 0.03$). The demonstration was also associated with an increase in the percentage of beneficiaries with any ED visit, but there was no impact on the average number of ED visits. The demonstration was associated with increased service use for children, as measured by hospitalizations and ED visits, which might indicate that CCBHCs in Oklahoma identified unmet needs among this population or that the CCBHCs served children that were sicker, on average, in unobservable ways than the comparison group.

The favorable impacts on hospitalizations and ED visits in Nevada and Oklahoma highlight the potential of the demonstration to improve outcomes for people who received care from CCBHCs. However, the variation in findings across states could reflect differences in model implementation or the populations served by CCBHCs. There could also be state-specific challenges to detecting impacts. In some states, the

rates of COVID-19-related hospitalizations and ED visits also differed between CCBHC clients and the comparison group during the demonstration period, which could influence the ability of the demonstration to impact outcomes.

B. Quality

Performance on some quality measures improved over time, but most of these improvements were not statistically different than the comparison group in the three states included in the impact analysis (Minnesota, Nevada, and Oklahoma). The demonstration was associated with favorable impacts on a measure of antidepressant medication management in Oklahoma. Although the demonstration did not impact any of the other quality measures included in the analysis, there were some improvements over time for CCBHC clients that were not statistically different from the comparison group.[10] For example, rates of 30-day follow-up after ED visits for mental illness and alcohol and drug dependence improved over time in Minnesota and Nevada, but they did so similarly for CCBHC clients and comparison groups.[11] However, findings on quality included in the report should be interpreted with caution because of the limitations associated with the analysis.[12] In future years of the evaluation, we will examine a broader set of quality measures reported by clinics and states.

Although we did not find impacts on most measures in the impact analysis, officials in most states suggested the CCBHC model has enhanced the quality of behavioral health care in their communities. State officials suggested several features of the CCBHC demonstration have the potential to improve care relative to other providers in their states. For example, several states credited the PPS as providing greater flexibility to provide the amount, type, and duration of services than traditional payment arrangements for community behavioral health providers, allowing more tailored and higher-quality care. Officials in a few states also noted that stronger requirements for care coordination and community partnerships for CCBHCs could result in improved care relative to other behavioral health providers.

C. Costs

The demonstration was associated with increased total Medicaid costs in Nevada and Oklahoma driven by increased costs for ambulatory visits.[13,14] In Nevada, the demonstration was associated with

[10] We analyzed the demonstration's impacts on the following measures that could be constructed using Transformed Medicaid Statistical Information System Analytic File data: Antidepressant Medication Management (AMM), Adherence to Antipsychotics for Individuals with Schizophrenia (SAA), Follow-up After Hospitalization for Mental Illness (FUH-AD and FUH-CH), Follow-up After Emergency Department Visit for Mental Illness (FUM-AD and FUM-CH), and Follow-up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (FUA-AD and FUA-CH).

[11] We did not analyze impacts on follow-up measures in Oklahoma because the claims data used for this analysis would likely undercount the delivery of follow-up care provided by CCBHCs during the demonstration period under the PPS-2 model used by the state.

[12] For example, the denominators for these measures were relatively small because not all beneficiaries or, for the follow-up measures, not all hospitalizations or ED visits, qualified for inclusion. We also assessed only quality measures that were measurable in claims data. The findings of mostly no differences between treatment and comparison groups might reflect other efforts in the states to improve the quality of care that similarly affected CCBHCs and comparison clinics, given that the findings generally indicated improvements over time for both groups.

[13] We did not analyze impacts on costs in Minnesota due to limitations associated with the state's payment data.

[14] Visits to CCBHCs are reflected in ambulatory visits and costs.

a borderline statistically significant increase in average total costs of $132 per beneficiary per month for CCBHC clients relative to the comparison group ($p = 0.05$). The demonstration was associated with an average increase of $109 per beneficiary per month for all-cause ambulatory visits ($p < 0.01$) for the treatment group relative to the comparison group, with an average $119 per beneficiary per month increase in behavioral health-related ambulatory costs for the treatment group ($p < 0.01$). In Oklahoma, the demonstration was associated with an average increase of $208 per beneficiary per month in total average costs ($p < 0.01$), driven by an average increase of $201 per beneficiary per month in behavioral health–related ambulatory costs ($p < 0.01$). The demonstration was also associated with decreased inpatient costs for some subgroups in both states; these reductions did not offset the increase in ambulatory costs.

The increased costs associated with the demonstration, however, and particularly the costs driven by increased costs for ambulatory behavioral health visits, might not be wholly unexpected. The demonstration did not have cost neutrality requirements, and most state officials did not anticipate immediate cost savings. Although officials in most states anticipated the demonstration could ultimately result in cost savings from improvements in quality and outcomes of care and reductions in acute care services, several also expected to see increases in costs, especially in the early years of the demonstration. Several other states shared that the model increased state Medicaid costs initially, noting increases were because of costs associated with funding ambulatory services through a new PPS, covering a more robust set of services, and serving more Medicaid-covered people than before the demonstration.

D. Future evaluation activities

In each year of the evaluation, we will submit an annual report synthesizing findings related to changes in demonstration implementation and answering additional evaluation questions related to the PAMA topics. In future evaluation reports, we will incorporate findings from additional interviews with state officials, clinic-level surveys, cost reports and quality measures submitted by states and CCBHCs, and interviews with leaders at CCBHCs. We also will present data from CCBHC client focus groups to better understand the experiences of people receiving care at CCBHCs.

I. Introduction

A. Demonstration overview

Section 223 of the Protecting Access to Medicare Act of 2014 (PAMA; Public Law 113-93) authorized the Certified Community Behavioral Health Clinic (CCBHC) demonstration, which allows states to test an innovative evidence-based strategy for delivering and reimbursing a comprehensive array of services provided in community behavioral health clinics. The demonstration aims to improve the availability, quality, and outcomes of outpatient services provided in these clinics. CCBHCs must offer nine types of services to all people who seek care, including people with serious mental illness, serious emotional disturbance, and substance use disorders (SUDs). These services include the following:

- Crisis mental health services
- Screening, assessment, and diagnosis
- Patient-centered treatment planning
- Outpatient mental health and substance use services
- Outpatient clinic primary care screening and monitoring
- Targeted case management
- Psychiatric rehabilitation services
- Peer supports, peer counseling, and family/caregiver supports
- Intensive, community-based mental health care for members of the armed forces and veterans

Demonstration states have some flexibility, however, to tailor these services to align with their Medicaid state plans and other regulations and to meet the needs of the communities they serve based, in part, on community needs assessments.

Services must be person- and family-centered, trauma informed, and recovery oriented. CCBHCs can have formal signed agreements with Designated Collaborating Organizations (DCOs) to provide demonstration services to CCBHC clients, but services provided through a DCO must meet CCBHC standards. Even if CCBHCs do not engage DCOs, the CCBHCs must maintain relationships with a range of health and social service providers to facilitate referrals and coordinate care. They must also offer services during accessible hours (including evenings and weekends) and in convenient locations (for example, by providing services in clients' homes and elsewhere in the community) and ensure timely access to crisis services 24 hours a day and seven days a week. Services may be delivered through telehealth or telemedicine.

The demonstration requires participating states to reimburse CCBHC services through a Medicaid prospective payment system (PPS). The PPS is intended to cover the expected costs of CCBHC services for Medicaid beneficiaries and provide CCBHCs with a flexible and stable source of funding. States select one of four PPS models to reimburse all demonstration CCBHCs in the state. Two options offer a fixed daily payment for each day a Medicaid beneficiary receives demonstration services (PPS-1 and PPS-3), and two offer a fixed monthly payment for each month in which a Medicaid beneficiary receives demonstration

services (PPS-2 and PPS-4).[15] PPS-3 and PPS-4 include the option of setting a separate special crisis services rate for several categories of crisis services (CMS 2024). After each demonstration year (DY), states must report measures that assess the quality of care provided to CCBHC clients. These measures assess best practices in care delivery (for example, timely follow-up after discharge from a hospital), outcomes (for example, improvement in depression symptoms), and clients' and family members' experiences with care. States report these measures using data from Medicaid claims and managed care encounter data, electronic health records, and surveys of CCBHC clients and their family members. Quality measure reporting provides CCBHCs and state officials with standardized metrics to monitor the quality of care and inform quality improvement efforts. PPS-1 and PPS-3 states have the option to provide CCBHCs with quality bonus payments (QBPs) based on their performance on quality measures. PPS-2 and PPS-4 states must provide QBPs.

B. Demonstration roll-out

In October 2015, the U.S. Department of Health and Human Services (HHS) awarded planning grants to 24 states to begin certifying clinics to become CCBHCs, establish their PPS, and develop the infrastructure to support the demonstration. To support the first phase of the demonstration, HHS developed criteria (as required by PAMA) for certifying CCBHCs in six areas: (1) staffing, (2) availability and accessibility of services, (3) care coordination, (4) scope of services, (5) quality and reporting, and (6) organizational authority (SAMHSA 2016a).[16,] The criteria provide a framework for certifying CCBHCs, but states can exercise some discretion in applying the criteria to support implementation of the CCBHC model in their local context. The certification criteria require CCBHCs to provide accessible care, including 24-hour crisis management services; engage people quickly through prompt intake services; and provide treatment for all adults, children, and adolescents regardless of their ability to pay. [17]

In December 2016, HHS selected eight of the 24 planning grant states to participate in the demonstration (Minnesota, Missouri, Nevada, New Jersey, New York, Oklahoma, Oregon, and Pennsylvania). The demonstration was originally authorized for two years and scheduled to end in July 2019, but Congress has extended it multiple times (Office of the Assistant Secretary for Planning and Evaluation 2021). It is currently authorized through September 2025 for the original states.[18]

[15] PPS-3 and PPS-4 were introduced as options for demonstration states to use starting in 2024. Before this, states could select PPS-1 or PPS-2. All states included in the findings in chapters II-VII used PPS-1 and PPS-2 at the time of this report.

[16] HHS published updated certification criteria in March 2023 (SAMHSA 2023; https://www.samhsa.gov/sites/default/files/ccbhc-criteria-2023.pdf).

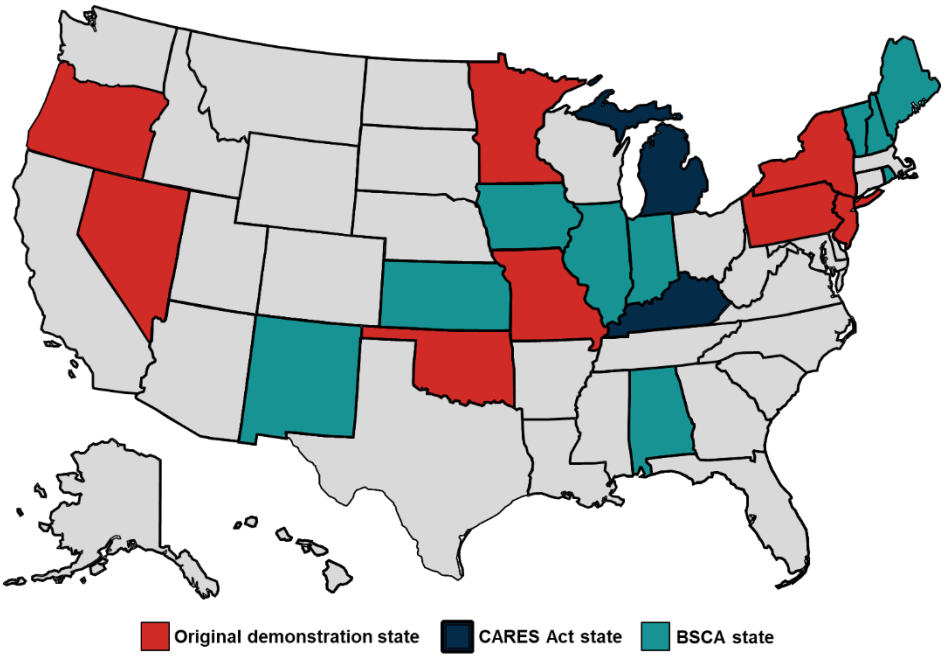
[17] Public Law 117-159 creates requirements regarding the availability and accessibility of services, including: crisis management services that are available and accessible 24 hours a day, the use of a sliding scale for payment, and no rejection for services or limiting of services on the basis of a patient's ability to pay or a place of residence. These form the basis of accessibility and availability requirements in the CCBHC certification criteria.

[18] Since the launch of the demonstration in 2017, two of the original states ended their participation. Pennsylvania chose not to continue participating after the first two years. Nevada ended its participation in the demonstration on July 1, 2023. Both states are continuing to fund CCBHCs under separate Medicaid authorities. Additionally, Minnesota briefly ended its participation on December 31, 2022, but rejoined the demonstration on July 1, 2023.

In August 2020, HHS announced that Kentucky and Michigan would begin participating in the demonstration as a result of the Coronavirus Aid, Relief, and Economic Security Act (CARES Act; Public Law 116-136) which allowed HHS to add two states from among the original 24 planning grant states. The Bipartisan Safer Communities Act, enacted in June 2022, authorized all states to apply to participate in the demonstration beginning in 2024 (Public Law No: 117-159).[19] It also extended the demonstration period for Michigan and Kentucky by four years, for a total of six years. Beginning July 1, 2024, and every two years thereafter, HHS may select up to 10 additional states to participate in the demonstration for a period of four years. In March 2023, HHS awarded planning grants to 15 states to develop proposals to participate in the demonstration. HHS will award additional planning grants to states in 2025. In June 2024, HHS announced it would welcome 10 new states into the demonstration.[20]

As of August 2024, 20 states have been selected to participate in the demonstration, including the eight original demonstration states (Minnesota, Missouri, Nevada, New Jersey, New York, Oklahoma, Oregon, and Pennsylvania), Kentucky and Michigan, and the 10 states added in June 2024 (Exhibit I.1).

Exhibit I.1. States selected to participate in the CCBHC Demonstration, September 2024



Notes: Original demonstration states were selected in 2016 to begin participating in 2017. CARES Act states were selected in 2021, and BSCA states were selected in 2024.

BSCA = Bipartisan Safer Communities Act; CARES = Coronavirus Aid, Relief, and Economic Security.

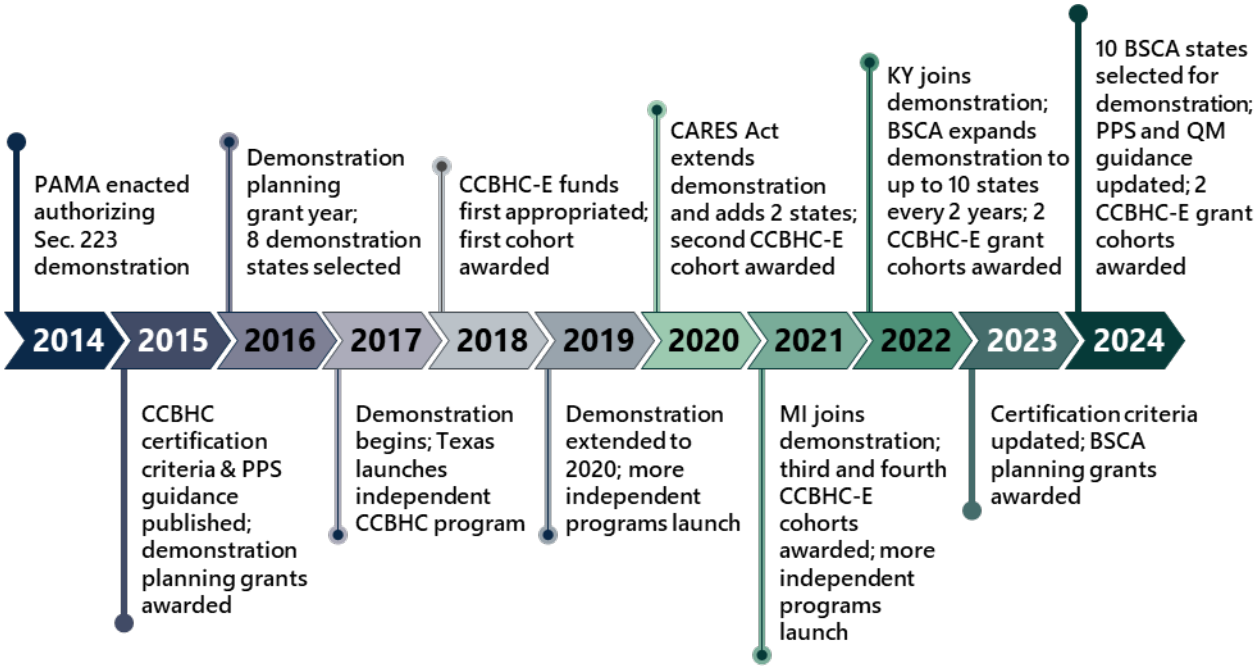
[19] States must have received a planning grant at any time since 2015 in order to apply to participate in the Demonstration.

[20] This includes Alabama, Illinois, Indiana, Iowa, Kansas, Maine, New Hampshire, New Mexico, Rhode Island and Vermont. Demonstrations in these states are expected to begin between July 2024 and July 2025. See: https://www.hhs.gov/about/news/2024/06/04/biden-harris-administration-expands-access-mental-health-substance-use-services-addition-10-new-states-ccbhc-medicaid-demonstration-program.html

Since the launch of the demonstration in 2017, two of the original states ended their participation. Pennsylvania chose not to continue participating after the first two years. Nevada ended its participation in the demonstration on July 1, 2023. Both states are continuing to fund CCBHCs under separate Medicaid authorities. Additionally, Minnesota briefly ended its participation on December 31, 2022, but rejoined the demonstration on July 1, 2023.

In addition to the demonstration, the Substance Abuse and Mental Health Services Administration (SAMHSA) supports implementation of the CCBHC model through the CCBHC-Expansion (CCBHC-E) grant program. CCBHC-E grants provide funding directly to clinics but do not change Medicaid payment or require states to certify clinics or oversee the grants.[21] To date, SAMHSA has awarded eight cohorts of CCBHC-E grants. Demonstration CCBHCs can participate in both the demonstration and CCBHC-E grant program. In 2023, at least one demonstration CCBHC in all demonstration states had received a SAMHSA CCBHC-E grant since 2018, and, in some states, all demonstration CCBHCs had received a CCBHC-E grant (Wishon et al. 2023). Demonstration CCBHCs use CCBHC-E grants to cover the costs of services for the uninsured and underinsured, to help launch the model in new clinic locations, or fill gaps in services. Beyond the CCBHC demonstration and CCBHC-E grants, some demonstration states and non-demonstration states have independently expanded the model through other Medicaid authorities, including state plan amendments (SPAs) and section 1115 demonstration waivers (Brown et al. 2021; Wishon et al. 2022).

Exhibit I.2. CCBHC model expansion timeline



10 BSCA states selected for demonstration; PPS and QM guidance updated; 2 CCBHC-E grant cohorts awarded BSCA = Bipartisan Safer Communities Act of 2022; CARES = Coronavirus Aid, Relief, and Economic Security Act of 2020; CCBHC = Certified Community

[21] CCBHC-E grantees that are not certified by their states must submit an attestation describing how they meet the CCBHC certification criteria.

Behavioral Health Clinic; CCBHC-E = Certified Community Behavioral Health Clinic-Expansion; PAMA = Protecting Access to Medicare Act of 2014; PPS = prospective payment system; QM = quality measure.

C. Evaluation description and goals

PAMA requires HHS to submit annual reports to Congress that assess the following:

1. *Access to community-based mental health services under Medicaid in the area or areas of a state targeted by a demonstration program as compared to other areas of the state*
2. *The quality and scope of services provided by certified community behavioral health clinics as compared to community-based mental health services provided in states not participating in a demonstration program and in areas of a demonstration state that are not participating in the demonstration*
3. *The impact of the demonstration on the federal and state costs of a full range of mental health services (including inpatient, emergency, and ambulatory services)*

In September 2016, the Office of the Assistant Secretary for Planning and Evaluation (ASPE) contracted with Mathematica and its subcontractor, the RAND Corporation, to evaluate the demonstration's implementation and impacts and to provide information for HHS's Reports to Congress. The evaluation included the eight original demonstration states and covered the two-year period for which the demonstration was initially authorized (Brown et al. 2021).

Exhibit I.3. Key findings from prior evaluation reports

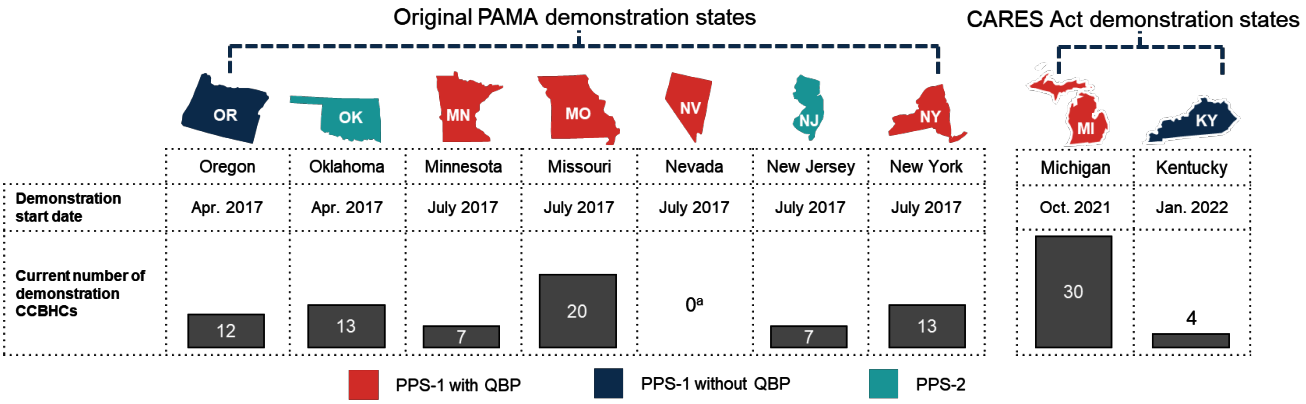
1. In early demonstration years, states and CCBHCs implemented activities to improve access, increased the number of clients served, expanded types of services and service capacity, hired and trained staff, developed partnerships with external providers, and changed many of their care processes. States and clinics were mostly able to overcome initial implementation challenges but cited workforce shortages and the possibility of the end of the demonstration as key challenges to sustaining the model.
2. The original demonstration states have generally been able to maintain CCBHC services and other certification requirements over time. CCBHCs have maintained and expanded activities to improve access to care and care coordination.
3. The number of people that CCBHCs care for has increased steadily, and the characteristics of CCBHC clients have generally remained consistent over time.
4. In some states, the introduction of the CCBHC model was associated with reductions in behavioral health–related emergency department visits during the first two years of the demonstration, and there was some evidence of positive impacts on hospitalization rates.
5. Quality of care in the first four demonstration years was comparable to available benchmarks, and performance on most measures remained stable or improved over time. Performance on some measures indicated opportunities to strengthen care coordination and data sharing.

Sources: Wishon et al. 2023; Brown et al. 2021.
CCBHC = Certified Community Behavioral Health Clinic.

As the demonstration continued in the original states and expanded to others, ASPE contracted with Mathematica and the RAND Corporation in 2021 and again with Mathematica, the RAND Corporation, and Advocates for Human Potential in late 2023 to further evaluate the demonstration.

This report describes findings related to the PAMA topics of access to care, quality of care, and the demonstration's impact on costs. The report includes findings from nine states with demonstration start dates before July 2024 (Exhibit I.3.). The report draws on Medicaid data, quality measure data, and interviews with state officials. The report describes the quantitative and qualitative methods and then summarizes findings within each area of the PAMA evaluation requirements.

Exhibit I.4. Characteristics of demonstration states included in report



Source: Interviews with state officials in spring 2024.

[a] Nevada ended its participation in the demonstration on July 1, 2023, and does not have active demonstration clinics at the time of this report. The evaluation team selected the state for inclusion in analyses of Medicaid claims data in 2021. These analyses cover the period from 2017 to 2021, several years before the state left the demonstration.

CCBHC = Certified Community Behavioral Health Clinic; DY = demonstration year; PPS = prospective payment system; QBP = quality bonus payment.

II. Methods

A. Quantitative analyses

1. Quality measure reports

SAMHSA provided states and CCBHCs with the technical specifications and a standard reporting template for the required demonstration quality measures (SAMHSA 2016a). The reporting template captures data on the number of unduplicated people served by CCBHCs and their characteristics. States submit completed quality measure reports to SAMHSA within a year following the end of each DY. We obtained the quality measure reports for the first five DYs submitted to SAMHSA by May 2024. Our analyses included 56 clinics in DYs 1 and 2 and 53 clinics in DYs 3 to 5 across the six original demonstration states. We used the quality measure reports to examine the age, gender, race and ethnicity, and insurance status of people who received CCBHC services in each year DY. Client demographic information was unavailable for Kentucky at the time of the analysis for this report, and only one year of data was available for Michigan, reflecting their first DY.[22] We report aggregate findings across all CCBHCs in a state and describe overall trends and variability across states. Appendix B includes detailed findings for each state.

2. Medicaid claims and encounter data

We used Transformed Medicaid Statistical Information System Analytic File (TAF) data to assess the impact of the demonstration on service use; quality of care; and, when feasible, costs among Medicaid and Children's Health Insurance Program (CHIP) beneficiaries (hereafter referred to as Medicaid beneficiaries). We limited these analyses to three of the original demonstration states—Minnesota, Nevada, and Oklahoma—because they had high-quality TAF data, strong comparison groups, and several years of experience implementing the CCBHC model. These states are diverse in three respects:

- Their PPS models (Minnesota and Nevada are PPS-1 states, and Oklahoma is a PPS-2 state)
- Their use of managed care arrangements (During the study period, Minnesota and Nevada used managed care, and Oklahoma used fee-for-service arrangements)
- Their geography

We used TAF data starting from 2015 (Oklahoma and Nevada) or 2016 (Minnesota), the earliest available, through 2021 (all three states).

We used a longitudinal difference-in-differences design with a rolling enrollment approach for the impact analyses, a robust method for estimating causal effects (Howell 2015).[23] Using this design, we selected

[22] Kentucky encountered challenges reporting demographic characteristics of people served in DY1 and resubmitted its quality measure data after the cutoff date for inclusion in this report. Although the count of people served was unaffected and is included in our analyses, we were unable to include analysis of demographic characteristics for Kentucky.

[23] This design enhances the design we used to assess impacts during the first two years of the demonstration (Brown et al. 2021). The present design allows us to detect impacts on *all* Medicaid beneficiaries served by the CCBHCs during the demonstration (while strong, the primary limitation of the previous design was that it included only existing clients, not new clients served during the demonstration period) and examines impacts over a longer period using additional years of available data.

beneficiaries enrolled in Medicaid at the time of their first visit to a CCBHC (treatment group) or other similar behavioral health clinic (comparison group) during the demonstration period and tracked their service use, quality-related outcomes, and costs over time. The impact estimates measure the change in outcomes among the treatment group (Medicaid beneficiaries who received care from CCBHCs) before and after their first visit to a CCBHC during the demonstration period relative to the changes in outcomes among a matched comparison group (that is, Medicaid beneficiaries who received care from other similar behavioral health clinics that did not become CCBHCs and with similar demographics and eligibility characteristics, baseline service use, and similar timing of the first visit date). A key assumption of this study design is that the change in outcomes observed among the comparison group is what would have been observed in the treatment group in the absence of the CCBHC demonstration. It is possible that the findings could differ if the impact analyses used a different design, such as a repeated cross-sectional analysis that did not follow the same set of beneficiaries longitudinally.

We report impacts for the full treatment and comparison population and by DY (that is, by subgroups defined by the DY of the first visit to a CCBHC or other behavioral health clinic). The analyses include four DY subgroups.[24] We implemented analyses by these subgroups for several reasons. First, we might expect impacts to increase over time as CCBHCs gained experience with the demonstration and changed clinical practice to support the CCBHC model. Second, states rebased their PPS rates and could make other policy changes at the start of each DY. To the extent that changes in PPS rates and policies influenced outcomes, stratifying the analyses by DY of the first visit provides an opportunity to observe whether impacts changed over time. Finally, the analysis period spans the period before and during the COVID-19 public health emergency (PHE) period. By stratifying the analyses by DY, we can also observe whether impacts differed in COVID-affected years.

Because differences across Medicaid programs and other state-related contextual factors could influence impact estimates, we identified within-state comparison groups and conducted the difference-in-differences analyses separately for each state. In other words, we conducted separate impact estimates for each state and then looked across the states to identify patterns in the findings (for example, if all three states demonstrated impacts on hospitalizations).

The remainder of this section details our approach to state selection, identification of the treatment and comparison groups, outcomes measures, and matching and regression methods. More details are available in Appendix A.

i. Accessing TAF data

We established a data use agreement with the Centers for Medicare & Medicaid Services (CMS) to access the unredacted TAF for these analyses on CMS's Virtual Research Data Center. We implemented all analyses on the Virtual Research Data Center.

[24] In Minnesota and Nevada, the four cohorts are defined as July 1, 2017, to June 30, 2018 (Cohort 1); July 1, 2018, to June 30, 2019 (Cohort 2); July 1, 2019, to June 30, 2020 (Cohort 3); and July 1, 2020, to December 31, 2020 (Cohort 4). In Oklahoma, the cohorts are defined as April 1, 2017, to March 31, 2018 (Cohort 1); April 1, 2018, to March 31, 2019 (Cohort 2); April 1, 2019, to March 30, 2020 (Cohort 3); and April 1, 2020, to December 31, 2020 (Cohort 4).

ii. Identification of treatment and comparison groups

We used a rolling enrollment approach to include as many beneficiaries who received services during the demonstration period as possible in the impact analyses. In this design, beneficiaries entered the analysis population at the time of their first visit to a CCBHC (treatment group) or other behavioral health clinic (comparison group) between the start of the demonstration (April 1, 2017, or July 1, 2017, depending on the state) through December 31, 2020. In this design, the baseline and demonstration periods for each beneficiary are defined relative to their demonstration enrollment date (that is, their first visit date to a CCBHC or other behavioral health clinic during the demonstration period). As a result, the calendar time covered by the baseline and demonstration periods differed for each beneficiary, depending on their demonstration enrollment date. Also, the analysis population included a mix of existing and new clients, so it included beneficiaries who had been receiving services from clinics that became CCBHCs and other behavioral health clinics before the demonstration began and those who newly began receiving services during the demonstration period. The comparison group excluded clinics that obtained CCBHC certification via a SPA or 1115 waiver or received a CCBHC-E grant in the year before and any year after their certification date or grant award.

We applied several criteria to exclude beneficiaries from the analysis population if we could not observe their outcomes or characteristics needed for matching. We excluded beneficiaries who (1) were dually eligible for Medicare and Medicaid (because Medicare is the primary payer for medical care and some behavioral health services and we did not have Medicare claims), (2) did not have full Medicaid benefits, (3) had other insurance coverage, or (4) had fewer than six months of enrollment in Medicaid in the baseline period. We also excluded beneficiaries if they did not have a behavioral health diagnosis on any claim during the baseline period or within the first month of their demonstration enrollment date (because we matched on behavioral health diagnoses) or if they had other TAF data issues, such as inaccurate death date data, indicating they died before their demonstration enrollment date, or missing or inaccurate address data. After applying these exclusions, the distribution of demographic and eligibility characteristics of the final analytic population remained similar to that of the full population of beneficiaries that CCBHCs served in each state. (More details are available in Appendix B.)

We used propensity score matching to develop matched comparison groups. This method matches beneficiaries in the comparison group with treatment group beneficiaries who have similar observable baseline characteristics. In doing so, we attempted to simulate conditions of a randomized controlled trial, in which the two groups are balanced on observable characteristics if randomization is successful. To the extent that unobserved characteristics are correlated with observed variables, propensity score models can also achieve good balance on unobserved characteristics between the two groups. It is always possible, however, that unobserved characteristics not correlated with the observed characteristics could affect selection into the treatment group. Appendix A, Section IV provides details on the variables and methods we used for propensity score matching and matching results in all three states.

iii. Outcomes measures

We assessed impacts on measures of service use, costs, and quality of care (Exhibit II.1). Service use outcomes included hospitalizations, emergency department (ED) visits, and ambulatory visits. We report service use and cost measures overall and separately for behavioral health and physical health care. (We

identified service use and cost measures as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition, and otherwise classified claims as physical health related)

Exhibit II.1. Outcomes measures included in the impact analyses[a]

Outcomes measure	Description
Service use measures (inpatient hospitalizations, ED visits, and ambulatory visits)[b]	
Number of events: hospitalizations; outpatient visits; and ambulatory visits (measured separately)	The number of events [hospitalizations or outpatient ED visits or ambulatory visits] per 1,000 beneficiaries per year
Any event: hospitalization or outpatient ED visit (measured separately)	The percentage of beneficiaries with any event [inpatient hospitalization or outpatient ED visit] in each year
Cost measures[b,c]	
Cost per beneficiary per month	Medicaid costs per beneficiary per month in each year
Quality measures	
Follow-Up After Hospitalization for Mental Illness (FUH)	The percentage of hospital discharges for people hospitalized for mental illness or intentional self-harm where there was a follow-up visit with a mental health provider within 7 or 30 days after discharge in each year
Follow-up After Emergency Department Visit for Mental Illness (FUM)	The percentage of ED visits for people seen for mental illness or intentional self-harm where there was a follow-up visit for mental illness within 7 or 30 days after the ED visit in each year
Follow-up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (FUA)	The percentage of ED visits for people seen for alcohol or other drug abuse or dependence where there was a follow-up up visit for alcohol use or other drug abuse or dependence within 7 or 30 days after the ED visit in each year
Antidepressant Medication Management	The percentage of people with major depression who remain on antidepressant for at least 12 weeks (acute phase) and 6 months (continuation phase) after the first visit to a CCBHC or comparison clinic
Adherence to Antipsychotic Medications for Individuals with Schizophrenia	The percentage of people with schizophrenia and schizoaffective disorder who remain on antipsychotic medication for at least 80 percent of time in treatment in each year

[a] For more information on measure specifications, see Appendix A, Section IV.

[b] We measured the service use and cost outcomes overall – that is, all-cause inpatient hospitalizations, all-cause outpatient ED visits, all-cause ambulatory visits, and total costs. In addition, we measured service use and cost outcomes separately for behavioral health-related and physical health-related care. We identified service use and cost measures as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. We classified other service use and costs as physical health related.

[c] In addition to measuring total costs per beneficiary per year, we also measured costs separately by service use category – that is, hospitalizations, ED visits, and ambulatory visits- and by whether the event was behavioral health- or physical health-related.

ED = emergency department

For all service use measures, we report impacts of the CCBHC demonstration on the average number of events per 1,000 beneficiaries per year. In addition, for hospitalizations and ED visits only, we report impacts on the percentage of beneficiaries who had at least one such event, measured as a binary yes/no

"any event" outcome. We selected these outcomes because CCBHCs' efforts to increase access to care and provide comprehensive services could decrease the use of the ED and lower hospitalization rates.

In Oklahoma, we examined impacts on Medicaid fee-for-service costs because the state's Medicaid program was fee for service during our study period. In Nevada, we examined impacts on costs based on payment amounts reported on fee-for-service claims and managed care encounter records. In Nevada's case, however, we limited the cost analyses to beneficiaries who had a demonstration enrollment date on or after January 1, 2018, or later because of the poor data quality of the managed care encounter records in 2015 and 2016 (for these analyses, we used 2017 data for the baseline period for beneficiaries with a demonstration start date in 2018). We were unable to examine impacts on costs in Minnesota because the state's managed care encounter records in the TAF did not contain reliable payment data.

We assessed impacts on the quality of care using several quality measures: (1) Follow-Up After Hospitalization for Mental Illness (FUH); (2) Follow-Up After Emergency Department Visit for Mental Illness (FUM); and (3) Follow-Up After ED Visit for Alcohol and Other Drug Abuse or Dependence (FUA); (4) Antidepressant Medication Management (AMM); and (5) Adherence to Antipsychotic Medications for Individuals with Schizophrenia (SAA).[25] We selected these measures because we could construct them with administrative data and because they have relatively large denominators to facilitate detecting differences in the change in measure performance over time for the treatment and comparison groups.

iv. Analyses

The difference-in-differences analyses for continuous claims-based service use and cost outcomes used ordinary least squares with beneficiary fixed effects and county-level, time-varying variables reflecting COVID-19 vulnerability and COVID-19-related deaths, as well as an indicator variable for whether the outcome was measured on or after March 11, 2020, the date when the World Health Organization declared COVID-19 a worldwide pandemic. We estimated impacts using the full 12-month baseline period and up to two 12-month periods after each beneficiary's first visit to a CCBHC (that is, their demonstration enrollment date). We fit models that included all beneficiaries (regardless of the DY of the first visit) and separate models for subgroups defined by the DY of the enrollment date. We conducted two sensitivity tests to check the robustness of the findings. First, to determine whether the results might be sensitive to outliers (that is, beneficiaries with extremely high service use or costs) in either group, we truncated (or top-coded) outcomes at the 99th percentile across all beneficiaries in the analytic sample. Second, we implemented the regression models using two years (instead of one year) of baseline data to examine whether the impact estimates changed when we accounted for longer pre-demonstration trends.

We also modeled binary service use and quality measure outcomes in the difference-in-differences framework using ordinary least squares. For these models, however, we did not use beneficiary fixed effects (Karaca-Mandic et al. 2012) and instead controlled for a range of beneficiary characteristics at baseline to adjust for any residual imbalance between the groups after matching, including characteristics

[25] Technical specifications for these Medicaid child and adult health care quality measures are available at https://www.medicaid.gov/medicaid/quality-of-care/performance-measurement/adult-and-child-health-care-quality-measures/index.html. We used 2021 Medicaid Core Set technical specifications because 2021 was the most recent year of TAF data included in our analyses, and the CCBHC quality measures technical specifications available at the time we constructed these measures were from 2016.

such as age, sex, race and ethnicity, Medicaid eligibility category, and presence of specific behavioral health and physical health conditions (listed in Appendix Exhibit IV.1).

In addition to assessing impacts on service use and costs for the full population in each state and for subgroups defined by DY, we conducted additional subgroup analyses among (1) adults (ages 19 and older); (2) children and adolescents (ages 18 and younger) and (3) beneficiaries with a SUD diagnosis. We implemented these additional subgroup analyses among all beneficiaries (in other words, not by DY of the first visit) to determine whether impacts were concentrated in any of these groups.

B. Qualitative sources: State official interviews

This report draws on interviews with state officials conducted at multiple points during their demonstrations.

1. *Interviews with state officials from Minnesota, Nevada, and Oklahoma during their first two DYs*. We conducted three rounds of semistructured interviews with state behavioral health and Medicaid officials responsible for the demonstration. We conducted the first round of interviews early in the first DY (fall 2017). We conducted the second round in spring 2018 and the third round in the spring 2019, toward the end of the original two-year demonstration period. The timing of these interviews aligns with the period covered by the Medicaid claims analysis and provides limited context to the claims findings. The first round of interviews gathered information about the demonstration planning grant period, early successes and challenges in fulfilling the certification requirements and following the data collection and monitoring procedures, and anticipated challenges or barriers to successful implementation. The second round of interviews gathered information on interim successes and challenges, successes in implementing demonstration cost-reporting procedures and quality measures, and early experiences with the PPS. The third round of interviews collected information on implementation progress and successes and challenges in the second DY.
2. *Interviews with demonstration states in spring 2024*. We conducted semistructured interviews in spring 2024 with state Medicaid or behavioral health agency officials responsible for the demonstration in each of the eight states participating in the demonstration at the time of the interviews.[26] Interviews included questions about states' and CCBHCs' activities to increase access to care; states' efforts to help CCBHCs adapt to updated certification criteria, demonstration guidance, and options HHS made available in 2023 and 2024; and officials' reflections on how the demonstration affected service use, quality of care, and costs.

One researcher led each interview, which lasted about 90 minutes, and another took notes. We asked interviewees for permission to audio-record the discussions to confirm the accuracy and completeness of interview notes. We reviewed and summarized interview responses separately for each state and identified cross-state themes.

[26] This included Kentucky, Michigan, Minnesota, Missouri, New Jersey, New York, Oklahoma, and Oregon

C. Limitations of data sources and methods

Findings presented in this report should be interpreted in the context of several limitations of the available data. Interview data generally reflect the perspective of a few state officials, and, in some cases, state officials were relatively new to the state or to the CCBHC demonstration. The information reported in interviews reflects the status of implementation when we collected the data, and states and CCBHCs might have continued to make changes and implement new activities and services after our interviews. We also acknowledge some limitations of the data and methods used for the impact analyses using TAF data. These include the following:

1. **Potential attenuation of impacts over time.** We followed beneficiaries longitudinally for up to two years following their first visit to a CCBHC (treatment group) or other behavioral health clinic (comparison group). All beneficiaries have at least one visit to a CCBHC or other behavioral health clinic during the demonstration period, but not all beneficiaries continued to receive services after the first year. In Minnesota and Oklahoma—across treatment and comparison groups combined—about 40 percent of the analysis population who remained enrolled in Medicaid and observable in the claims data continued to receive services in the 13 to 24 months after their first visit to a CCBHC or other behavioral health clinic. In Nevada, this percentage was lower, with about 25 percent of the analysis population receiving services in the second year after their first visit. It is therefore possible that impacts in the second year following their first visit could be attenuated by beneficiaries having discontinued services or seeking services elsewhere. Conversely, it is possible that impacts do not attenuate if many beneficiaries, particularly those with less severe needs, received all the services they needed in their first year and continued to have positive outcomes over time.
2. **Other, concurrent statewide Medicaid policies and programs to improve behavioral health care**. While also participating in the CCBHC demonstration, states have made other investments and introduced innovations in behavioral health care. For example, Minnesota enacted a statewide SUD reform package in 2017 that could have made non-CCBHC behavioral health clinics more similar to CCBHCs by providing coverage statewide for peer recovery support services and withdrawal management. Such investments could decrease the likelihood of detecting impacts of the CCBHC demonstration because comparison group beneficiaries might have received services similar to CCBHC services through these other initiatives.
3. **Multiple comparisons and power.** We conducted impact analyses for all beneficiaries in the analysis population overall and separately for cohorts defined by the DY of a beneficiary's first visit to a CCBHC or other behavioral health clinic. For both sets of analyses (overall and by cohort), we reported impacts for months 1 to 12 and months 13 to 24 after the demonstration enrollment date (first visit) as well as impacts over months 1 to 24 combined. Although this approach facilitates examining the potential change in impacts over time, it also increases the number of statistical tests and the associated risk of making a type I error (that is, concluding that a finding is statistically significant when it is not). We addressed this issue in two ways:
   - *Reporting findings as statistically significant only at the $p < 0.05$ level.* In our earlier evaluation of the CCBHC demonstration, we used a $p < 0.10$ threshold for statistical significance to not miss potentially important signals the demonstration had impacts (Brown et al. 2021).

– Reporting the cumulative estimates (that is, the impacts over months 1 to 24 combined). We also report the full set of impact results by year in Appendix A.

The subgroup analyses by DY of the first visit may also have limited power to detect statistically significant differences because each subgroup includes fewer beneficiaries relative to the full population. For this reason, we assessed the consistency of the direction and magnitude of the impact estimates across all the subgroups defined by DY of the first visit rather than rely solely on statistical significance to draw conclusions about impacts across these subgroups.

4. **Limited availability of managed care cost data.** Medicaid managed care plans covered many beneficiaries in Minnesota and Nevada. We planned to analyze payments that managed care plans made to providers (in addition to all fee-for-service payments) to approximate impacts on costs in these two states, but payment data on managed care encounter records in Minnesota's TAF were unusable for most of the study period, so we could not conduct cost analyses in Minnesota. In Nevada, the quality of provider payment data on managed care encounter records was poor in 2015 and 2016, but the quality appeared much improved by 2017 and in later years. For Nevada, we limited the cost analyses to beneficiaries with demonstration enrollment dates on or after January 1, 2018, ensuring all beneficiaries have one year of usable baseline cost data. Further, we did not match on baseline costs (because of poor quality cost data in the earlier years), though we confirmed that baseline trends in costs were parallel between treatment and comparison groups after matching among the subset of beneficiaries with an enrollment date on or after January 1, 2018. In Oklahoma, there were no concerns using TAF payment data because nearly all services were billed and paid through fee-for-service arrangements, making cost analyses feasible.[27]

5. **Limitations of PPS-2 billing for claims-based analyses in Oklahoma.** CCBHCs in Oklahoma (the only PPS-2 state in the impact analysis) received a monthly payment for each beneficiary to whom they provided services during any calendar month. CCBHCs therefore only needed to submit one claim per beneficiary per month during the demonstration period to receive a PPS payment for the month, so we cannot reliably observe every visit to these CCBHCs. For this reason, we did not analyze impacts on ambulatory visits in Oklahoma. We also did not analyze the impacts on three of the quality measures (FUH, FUA, and FUM) that require measuring individual visits. For example, a beneficiary with a visit to a CCBHC on April 2, 2019, and a qualifying ED visit for FUM on April 10, 2019, might have received follow-up from the CCBHC between April 11, 2019, and April 30, 2019, but we might not observe the claim for the follow-up visit if the CCBHC only submitted one claim for this beneficiary for April 2019 based on the beneficiary's visit in April 2, 2019. Oklahoma did not differ from other states in the methods we used to measure hospitalizations, ED visits, or other quality measures.

6. **Possible bias due to unmeasured differences between treatment and comparison groups**. We matched beneficiaries on a wide array of variables reflecting demographic characteristics, Medicaid eligibility characteristics, presence of behavioral health and physical health conditions, and service use in the baseline period. However, as with all matched comparison group designs, potential residual differences between the treatment and matched comparison groups on unobservable characteristics

[27] Although Oklahoma provided capitated payments to primary care providers for primary care case management, all other services were reimbursed through fee-for-service arrangements during our study period.

could introduce bias into the impact estimates. For example, our treatment and comparison groups were well-balanced on the percentage of beneficiaries with depression during the baseline period, but one group could have more severe depression on average than the other (which is not reliably measured using diagnosis codes); this could lead to increased service use and costs in the demonstration period unrelated to the demonstration.

D. Generalizability of findings

The findings from the impact analyses reflect only Medicaid beneficiaries who met our inclusion criteria and may not be representative of the full population of beneficiaries served by CCBHCs or comparison clinics. We expect these findings likely reflect the full Medicaid population served by CCBHCs within each state based on our comparison of demographics and enrollment characteristics of the analysis population versus all Medicaid beneficiaries served by CCBHCs (Appendix B). However, in Oklahoma the analysis population included disproportionately more children and adolescents than the full population served by CCBHCs (see Appendix Exhibit C.1 for characteristics of the full population). Findings also might have differed had we selected a different set of CCBHC states.

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III. Status of Demonstration Implementation in Active Demonstration States

HHS has undertaken a significant effort to update CCBHC model requirements and guidance in recent years to support the extension and expansion of the demonstration as well as growth in opportunities to implement the CCBHC model through other funding sources. In February 2023, HHS released guidance allowing existing demonstration states (that is, those that began participating before 2023) to add new CCBHCs to their programs for the first time since the start of the demonstration (HHS 2023). In March 2023, HHS updated the CCBHC certification criteria to reflect lessons from several years of model implementation and the changes to the national service delivery landscape since the criteria were developed in 2015 (SAMHSA 2023). These updates include alignments to improve applicability of the criteria to demonstration and non-demonstration CCBHCs, guidance regarding the components of a comprehensive crisis system, and increased focus on SUDs and overdose in light of the ongoing national overdose crisis. In early 2024, HHS also updated the PPS Technical Guidance to states and clinics on the development of the state's PPS and finalized updates to technical specifications, guidance, and general information related to the CCBHC quality measures. This chapter describes changes in the number of demonstration CCBHCs and states' activities to support CCBHCs in complying with updated certification criteria and other demonstration guidance as of May 2024.

A. Number of CCBHCs in demonstration states

As of May 2024, four of the eight active demonstration states added CCBHCs in response to the guidance from HHS, expanding the number of demonstration CCBHCs from 77 in June 2023 to 106 in May 2024. Three of these states (Oklahoma, Missouri, and Minnesota) already supported CCBHCs outside the demonstration through Medicaid SPAs and moved some or all of their CCBHCs into the demonstration. Likewise, before HHS allowed the addition of demonstration CCBHCs, Oklahoma had certified the state's remaining community mental health centers as CCBHCs and paid them through a SPA but later incorporated those clinics into the demonstration, taking it fully statewide. Missouri added three CCBHCs supported through SPAs to

Exhibit III.1. Number of demonstration clinics, 2023 to 2024

State		2023	2024
Kentucky	»	4	4
Michigan	»	13	30
Minnesota	»	6	7
Missouri	»	19	20
New Jersey	»	7	7
New York	»	13	13
Oklahoma	»	3	13
Oregon	»	12	12
Total	»	**77**	**106**

Source: Interviews with state officials in spring 2024.
Notes: We are excluding Nevada as the state no longer has any active demonstration clinics.

the demonstration.[28] Minnesota offered all CCBHCs supported through their SPA the opportunity to join the demonstration, and one decided to join. Michigan was not funding CCBHCs through an alternative Medicaid authority before February 2023, but added existing state Community Mental Health Services Programs and CCBHC-E grantees to the demonstration.

Four demonstration states—Kentucky, Michigan, New Jersey, and New York—were exploring opportunities to certify additional demonstration clinics in the future. State officials cited the opportunity to test new payment and service delivery strategies while receiving an enhanced Federal Medical Assistance Percentage rate as the primary motivations for considering increasing the number of demonstration CCBHCs. State officials in Michigan requested funding from the state legislature to add clinics to the demonstration at the beginning of their next DY (October 2024). The state could add 10 to 13 additional clinics at that time. Kentucky expected to add up to six clinics in 2026. New York planned to phase in 26 clinics to the demonstration over two years. The state received funding from its legislature to add 13 CCBHCs to the demonstration in July 2024 and another 13 in July 2025.

Two demonstration states—Minnesota and Oregon—may expand the number of CCBHCs through other Medicaid options. Two others—Missouri and Oklahoma—did not have plans to add demonstration clinics because the demonstration is already operating statewide. Minnesota officials were uncertain whether the state will add demonstration clinics at the next opportunity, and Oregon did not plan to add clinics to the demonstration because the demonstration is expected to end in September 2025 in these states. Yet both states expected to continue and expand the model through other funding mechanisms. Oregon planned to submit a SPA with the intention of eventually taking the CCBHC model statewide to all 37 counties. Minnesota expected it might add clinics in the future under its existing SPA. Missouri did not expect to add demonstration clinics, noting that demonstration CCBHCs already served all its counties and service areas. Oklahoma did not expect to add more clinics to the demonstration because all of its community mental health centers already participate in the demonstration.

B. State activities to help CCBHCs comply with updated demonstration requirements and guidance

States have undertaken considerable efforts to help CCBHCs comply with the updated certification criteria. As of May 2024, officials in all states were actively working with CCBHCs to help them understand and apply the updated certification criteria. States and CCBHCs must comply with the updated criteria by the start of the state's DY beginning on or after July 1, 2024. As a result, states are on somewhat different timelines for achieving compliance depending on their demonstration start date. Oregon, Minnesota, and Kentucky, which are not required to comply until 2025, are not as far along in their planning and support activities as states with July 2024 demonstration start dates. Still, most states reported taking similar approaches for understanding and assisting CCBHCs with implementing the updated criteria.

[28] Missouri originally certified 15 demonstration clinics in 2017. In 2021 and 2022, the state added four clinics to the demonstration that were certified as part of the original planning grant but were not able to launch the model in 2017. The state certified and funded three additional CCBHCs through a SPA in 2021 and added these clinics to the demonstration in 2023. There have been several CCBHC mergers in the state, bringing the number of CCBHCs to 20 as of spring 2024.

After closely reviewing the updated criteria, officials in most states spoke with CCBHCs to identify any challenges that might arise from complying with the updates, clarify and answer questions about the updated criteria, and understand what activities CCBHCs already had in place to come into compliance. States then developed additional written guidance and developed technical assistance offerings for CCBHCs. Missouri, for example, initially identified 42 updates to the criteria that would affect the state's demonstration-related policies, the Code of State Regulations, or would otherwise affect the state's day-to-day implementation of the model. The state then held a series of calls, each focused on a section of the criteria, during which officials and CCBHCs discussed clinic policy changes and the practical implementation steps needed to support each update. Some states reported developing additional written materials to help CCBHCs understand and implement the CCBHC criteria updates. For example, Oregon developed comprehensive written guidance to describe the changes the state expects to see when reviewing clinic documents and systems for compliance. This includes, for example, changes in written clinic policies and procedures, fields the CCBHCs will need to include in their electronic health records, and other information that officials will want to observe when conducting desk reviews and site visits to confirm compliance.

Several states noted the need to update state demonstration regulations and requirements. Missouri, for example, conducted a comprehensive review and updated the state's Code of State Regulations to reflect the updated criteria, and the state legislature was reviewing these changes at the time of the interview. New York updated its provider manual, which outlines federal and state-specific requirements for CCBHCs, to align with the updated criteria. Officials in some states saw the work to help CCBHCs come into compliance with criteria as a broader opportunity to review which state requirements and practices were working well and identify others that need attention to better support the goals of the demonstration.

Several states have used their existing CCBHC learning collaboratives to support implementation of the updated criteria. For example, New York used its learning collaborative to educate existing and new CCBHCs about the updated criteria together. This approach not only provides an opportunity for the existing CCBHCs to teach the new CCBHCs but also ensures consistency in implementing the updated criteria across the state's CCBHC demonstration cohorts.

States expect to support CCBHCs in implementing updated PPS guidance and quality measure specifications. As in earlier years of the demonstration, at the time of our interviews, state officials expected to provide substantial technical assistance focused on the quality measures in the coming year, especially to clinics that recently joined the demonstration and have less experience with reporting measures in general. Several states had already held learning collaboratives or work groups on measures to review changes to the measure specifications and answer questions from CCBHCs, but they were relatively early on in their planning for quality measure–focused technical assistance at the time of interviews. Officials anticipated helping CCBHCs identify the changes they will need to make to their health information technology systems and data processes to support reporting the measures. States also reported plans to review the updated PPS guidance. Officials were working to understand opportunities to implement new PPS options in the future and developing plans to help CCBHCs prepare for changes to cost report templates and updates to rate-setting processes resulting from HHS's guidance. At the time of data collection, none of the eight states had immediate plans to change the CCBHC PPS option the

state was using; however, all states except Minnesota and Oklahoma planned to explore whether to implement new PPS options in the future. These states were considering a shift from their current daily or monthly rate option to a corresponding daily or monthly rate option with a dedicated crisis services component (that is, PPS-1 to PPS-3 or PPS-2 to PPS-4).

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IV. Access to Care

To address the PAMA requirements on access, we first examined the number and characteristics of people that CCBHCs served, including changes in the number and characteristics in original states. We then examined the characteristics of the Medicaid beneficiaries included in the TAF analyses on the impacts of the demonstration. Finally, we report the demonstration's impacts on Medicaid service use and costs.

A. Number and characteristics of people that CCBHCs served across DYs

The number of people that CCBHCs served each year in the original demonstration states has increased steadily over time. Across all demonstration states, the number of people CCBHCs served increased from 286,089 in DY1 to 340,334 in DY5 (Exhibit IV.1). CCBHCs in all states except Minnesota and Oregon served more people over time. In Oregon, this was mostly because the state decertified three clinics in 2019 (DY3) during a period of funding instability but has since recertified these clinics.[29] At the state level, the largest changes from DY1 to DY5 were in New York (49,903 to 68,248) and Missouri (121,787 to 159,468).

Exhibit IV.1. Number of people CCBHCs served in original states, by DY

State	DY1 (2017–2018)	DY2 (2018–2019)	DY3 (2019–2020)	DY4 (2020–2021)	DY5 (2021–2022)
Aggregate	**286,089**	**308,831**	**303,911**	**315,349**	**340,334**
Minnesota	23,027	25,402	23,935	20,725	23,586
Missouri	121,787	132,565	137,753	145,949	159,468[a]
New Jersey	17,851	19,129	20,396	21,742	20,121
New York	49,903	55,693	57,377	62,972	68,248
Oklahoma	20,610	22,741	24,647	25,583	27,201
Oregon	52,911	53,301	39,803[b]	38,378[b]	41,710[b]

Source: Mathematica and the RAND Corporation's analysis of DY1 to DY5 quality measure reports and consultations with state officials.

Note: Numbers are counts of unduplicated CCBHC clients.

[a] Missouri counts reflect the state's 15 original demonstration clinics. We excluded partial data for several clinics added to the demonstration partway through DY5.

[b] Oregon began the demonstration with 12 CCBHCs but decreased to 9 CCBHCs in DY3 and DY4. One clinic was recertified by the beginning of DY5 and is included in DY5 counts.

CCBHC = Certified Community Behavioral Health Clinic; DY = demonstration year.

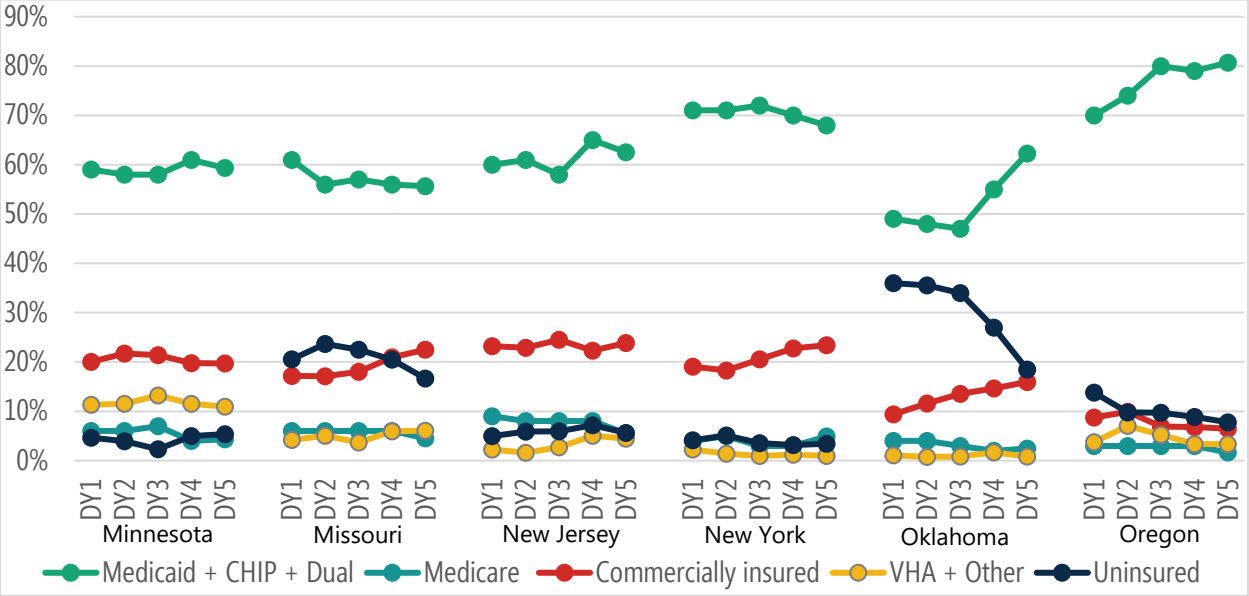
With few exceptions, the demographic characteristics of CCBHC clients were similar across DYs (see Appendix C for detailed findings). For example, across states:

- About 76 percent of people served by CCBHCs were adults (age 18 years and older), and about 24 percent were children or adolescents (ages 0 to 17) in each DY. In all states but New Jersey and Oregon, there was a slight increase in the percentage of children and adolescents served (2 to 3 percent) from DY1 to DY5. There was a decrease in the percentage of children and adolescents served of about 5 percent in New Jersey and 3 percent in Oregon from DY1 to DY5.

[29] One clinic was recertified by the beginning of DY5 and is included in DY5 counts. The others will submit data again in future years.

- CCBHCs served slightly more females than males in all states, with the proportion who were female across all states ranging from 51 to 53 percent over DYs. The difference was larger in New Jersey, where the proportion who were female ranged from 55 percent to 58 percent each year.
- Most of the people CCBHCs served were White, ranging from 70 to 73 percent over DYs. In all, 11 to 12 percent of people CCBHCs served were African American each DY, and 8 to 10 percent were Hispanic or Latino over DYs (ranging from 4 percent in Missouri in DY4 to 19 percent in New Jersey in DY2).
- There were two notable changes in the distribution of insurance status across DYs (Exhibit IV.2.). First, in Oklahoma and Oregon, the proportion of people CCBHCs served who were covered by Medicaid increased. In Oklahoma, the proportion of people served who were uninsured decreased as the proportion covered by Medicaid increased, which could reflect the state's expansion of Medicaid to new populations in July 2021. Oregon expanded Medicaid before the demonstration. Second, in Missouri, New York, and Oklahoma, the percentage of people CCBHCs served who had commercial insurance increased over time.

Exhibit IV.2. Insurance status of people receiving services from CCBHCs, by DY



Source: Mathematica and the RAND Corporation's analysis of DY1 to DY5 CCBHC Quality Measure Reports.

Note: Oklahoma and Missouri expanded Medicaid in 2021. DY1 = 2017–2018, DY2 = 2018–2019, DY3 = 2019–2020, DY4 = 2020–2021, DY5 = 2021–2022.

CCBHC = Certified Community Behavioral Health Clinic; CHIP = Children's Health Insurance Program; DY = demonstration year; VHA = Veterans Health Administration.

CCBHCs in Kentucky and Michigan served more people in the first DY than state officials anticipated. In interviews in 2023, Kentucky officials estimated the state would serve 49,890 people in their first year, but the state reported CCBHCs served 79,967 people. Michigan officials estimated CCBHCs would serve 62,500 people in the first year but reported serving 82,280.

Characteristics of clients served in the first DY in Michigan were generally similar to those served in the first DY in original states in gender and ethnicity (see Appendix C CARES Act Cohort exhibits for detailed

findings).[30] In Michigan, however, a larger percentage of people served by CCBHCs were covered by Medicaid, CHIP, or both Medicaid and Medicare relative to other states (85 percent versus the 64 percent aggregate in the original states).

Exhibit IV.3. Number of people served by CARES Cohort CCBHCs in first DY

State	DY1 (2021–2022)
Aggregate	162,247
Kentucky	79,967
Michigan	82,280

Source: Mathematica and the RAND Corporation's analysis of quality measure reports.
CCBHC = Certified Community Behavioral Health Clinic; DY = demonstration year.

The characteristics of people CCBHCs served align with the expectations of state officials, and most states reported reaching new and underserved populations. State officials attributed growth in the number of CCBHC clients to efforts to engage new people in care. One official in New York noted, for example, that "we've had a growth in the number of individuals served since the beginning of the demonstration. And we feel pretty happy about the fact that there's statistics that shows 25 percent of those folks were new individuals…. helping us to feel like we're casting a net, and we're operating a program that really, truly is engaging people that maybe were not already within our service delivery system." According to state officials, CCBHCs in Kentucky, Michigan, New Jersey, and Oklahoma had served the types of people expected and steadily increased the numbers of people served. Minnesota officials affirmed growth in the number of people served by CCBHCs but did not cite a specific reason for these changes over time.

> *"CCBHCs tend to serve a higher percentage of people with serious and persistent mental illness than their non-CCBHC counterparts, which I know was a big target population for the model. We're seeing a lot of the individuals with some of the highest needs in their community really relying on the comprehensive services of a CCBHC….I would say, based on the characteristics that we see in their data templates and data that we've pulled, that they're serving the populations intended and that we would expect in mostly the ways that we would think it would play out."*
>
> —Oregon state official

Some states attributed growth in the number of people CCBHCs served to their efforts to engage specific populations:

- Michigan officials reported CCBHCs served more people with mild or moderate behavioral health conditions in care than anticipated at the outset of the demonstration.
- Oklahoma officials reported CCBHCs have been able to increase the number of people in their highest-need population[31] as a result of targeted work by a state care coordination team working closely with

[30] Kentucky encountered challenges reporting demographic characteristics of people served in DY1 and resubmitted its quality measure data after the cutoff date for inclusion in this report.

[31] The state defined this population as people with high utilization of crisis services, recent inpatient stays, and residential stays.

the CCBHCs to ensure they are engaging this population. State care coordinators provide elevated level of care alerts to CCBHCs to identify this population and help with discharge planning from the hospitals back into the community. The state team also provides monitoring, follow-up, and other assistance to help keep people with the highest needs engaged in services.

- New Jersey reported increases in the number of people served with co-occurring SUD and serious mental illness and new (or new to Medicaid) clients because of concerted efforts at the state and CCBHC levels to engage these populations.
- Kentucky reported an increase in veterans and people experiencing homelessness.
- Missouri shared that CCBHCs have improved in their ability to engage the oldest and youngest populations. One official noted that "the younger people and the older people are now getting in the door a lot more often, instead of just adult[s]."

States cited certain features of the CCBHC model as helping grow the number of people CCBHCs served:

- **The PPS.** Officials from Kentucky, Michigan, Minnesota, and Oklahoma credited the PPS in allowing CCBHCs to serve the numbers and types of people expected during the demonstration. States cited the flexibility the PPS offers to develop care delivery structures that more effectively meet population needs and fund staff hiring and retention as crucial for increasing access. For example, Oregon noted that CCBHCs' ability to hire more staff and a more diverse range of staff types has allowed them to be creative in how they engage with their community. One official shared that "we have clinics [with staff] that do community engagement events, that do street outreach. And their funding mechanism has really allowed them to be able to more financially sustainably do that, which helps get people into services." Oklahoma officials echoed this sentiment, noting the PPS has enabled historically underfunded CCBHCs to receive payment for the amount it actually it costs to provide services, allowing CCBHCs to pay staff higher salaries and more effectively recruit and retain them. Increases in the number of staff enable CCBHCs to expand the number of people served in turn.
- **Requirements for availability and services.** All states highlighted the certification criteria for availability and access as driving activities to increase engagement in care. For example, state officials from Kentucky, Michigan, and New Jersey mentioned the community needs assessments, which CCBHCs must conduct at the beginning of the demonstration and at least every three years, have helped them prioritize and plan for engaging new populations.[32] The community needs assessments have identified gaps in services for underserved populations, allowing CCBHCs to tailor offerings and engagement strategies to attract new clients. In addition, Michigan, Missouri, and New York officials highlighted that the model's requirement to provide services across the lifespan, including to youth and older adults, and offer new and more tailored services for a broader range of ages has encouraged some CCBHCs to serve populations they had not previously. Michigan also shared that, before the CCBHC demonstration, most of the state's CCBHCs focused on serving people with severe mental health conditions who would

[32] The community needs assessment is a systematic approach to identifying community needs and determining a program's capacity to address the needs of the population served. The assessment is intended to identify current conditions and desired services or outcomes in the community based on data and input from key community stakeholders.

qualify for the state's specialty behavioral health services capitation rate. Officials noted the change to the PPS enabled CCHBCs to expand access to Medicaid beneficiaries with mild-to-moderate mental illness because CCBHCs receive PPS payment regardless of the severity of a person's condition.

- **Partnerships and community engagement.** A few states cited the new and strengthened partnerships that the certification criteria required as key to enabling CCBHCs to serve the number and types of people expected. Outreach to and care coordination across partners and engagement with other stakeholders has increased referrals to care. For example, Kentucky CCBHCs have reported significant engagement of and increases in partnerships with primary care providers in their communities. As one official noted that CCBHCs "report to me 'Previously, we would never have thought to have a conversation with anybody's physical care provider.'…they're embracing it now….a couple of them would be reached out to by primary care providers [who said], 'we never even knew what you did. Never knew who you were.' But the outreach is starting to bear fruit." Similarly, Michigan noted CCBHCs are becoming better known in their communities through partnerships and engagement activities, leading to increases in access and people served.

> *"We've heard anecdotally that, as the word gets around, these clinics, especially the ones that have been traditionally limited to providing high-level specialty behavioral health services, their doors have widened as the words gets around that the services are available and they're open to anybody where people have gone there. And especially…where there's big gaps in prescribers, or psychiatry, or substance use treatment."*
>
> —Michigan state official

Officials in a few states described some populations as more difficult to engage in services than others, but states and CCBHCs are working to address these challenges. States most often reported challenges engaging children and adolescents, veterans, and older adults in CCBHC services.

- **Children and adolescents.** New Jersey made a concerted effort to engage the state's Department of Children and Families during the past year amid its ongoing efforts to improve CCBHCs' ability to reach children and youth. As described in previous evaluation reports, New Jersey CCBHCs have struggled somewhat to develop services for and engage children and youth, in part because of the state's robust Children's System of Care (CSOC). The CSOC historically has provided most specialty mental health services for children in the state, facilitated by a managed care provider responsible for ensuring that children with SED or otherwise in need of higher-level mental health care receive intensive services from that system. As a result, referrals for children's mental health services have typically been made to the CSOC rather than CCBHCs. State officials shared that discussions with the CSOC have been fruitful, however, and the CSOC is increasingly open to CCBHCs providing children's services. New Jersey hopes this will improve CCBHCs' ability to reach children and youth.
- **Veterans.** New Jersey and Oregon also described challenges engaging veterans, explaining that the population is often served in other settings, such as Veterans Affairs hospitals and facilities, making it less likely they would seek services from CCBHCs. An official in Oregon added that CCBHCs sometimes encounter difficulty navigating "various types of insurance and benefits available to a veteran and when a CCBHC is allowed to take them on and still receive payment." When the state becomes aware of a veteran not being served, the state health agency steps in and helps identify solutions.

- **Older adults.** Oregon shared that engaging the older adult population has been more challenging for CCBHCs. As one official said, "The nature of the stigma around getting help for [the older adult] population…can make it really challenging for them to ask for help; then when they do, there's all these [insurance-related] hiccups that they have to navigate, and they just give up before they get going." The state held an all-CCBHC meeting on older adult services and hopes that recent changes to Medicare will help address some of the insurance hurdles older adults face when seeking services at CCBHCs.

B. Demonstration impacts on Medicaid service use

Here, we summarize the characteristics of—and COVID-19-related service use among—Medicaid beneficiaries in the matched treatment and comparison groups in Minnesota, Nevada, and Oklahoma. We then report detailed findings on impacts, separately by state, for hospitalizations, ED visits, and ambulatory visits, including results from subgroup analyses.[33]

1. Characteristics of the analysis populations in Minnesota, Nevada, and Oklahoma

The matched treatment and comparison groups in Minnesota, Nevada, and Oklahoma were well-balanced in their demographic and diagnostic characteristics and baseline service use trends (see Appendix A, Section V for details on propensity score matching methods and results). Although there is always a possibility of unobserved differences between the treatment and matched comparison groups, the similarity of the two groups on observable characteristics suggests that the comparison group in each state provides an appropriate counterfactual (that is, what would have happened in the absence of the demonstration). There were, however, some differences in the analysis populations across states. Although these cross-state differences are immaterial for the impact analyses (because we analyze each state separately), they might help contextualize differences in findings across states. For example, if the demonstration generally had larger impacts on beneficiaries with SUDs, there might be more opportunity to detect impacts in states that have more beneficiaries with SUDs. Some meaningful differences across the states in demographics and eligibility-related characteristics included the following:

- Oklahoma had the largest percentage of beneficiaries ages 18 and younger (63 percent versus 37 percent in Minnesota and 23 percent in Nevada) and the youngest mean age (age 21 versus 28 in Minnesota and 31 in Nevada).
- Nearly all treatment and matched comparison beneficiaries in Minnesota and Oklahoma had a mental health condition in the baseline period (97 and 98 percent, respectively) compared with about 78 percent among Nevada's analysis population. Yet 58 percent of Nevada's analysis population had a SUD in the baseline period, compared with 32 and 17 percent in Minnesota and Oklahoma, respectively. The relatively larger percentage of beneficiaries with a SUD in Nevada compared to Minnesota and Oklahoma was not unexpected; the clinics that became demonstration CCBHCs in Nevada primarily provided SUD services before the demonstration whereas clinics in Minnesota and Oklahoma were mostly community mental health providers offering limited SUD services before the demonstration began.

[33] The subgroups include children and adolescents (ages 18 and younger), adults (ages 19 and older), people with SUD, and cohorts defined by DY of the first visit. We conclude with summary of findings within and across states.

2. COVID-19-related hospitalizations and ED visits

The analysis period covers time before and during the COVID-19 pandemic. Because our estimates of impacts on service use could be influenced by different rates of COVID-19 in the treatment and comparison groups, we assessed whether the percentage of treatment and comparison groups with any COVID-19-related hospitalizations or ED visits (hereafter COVID-related hospital use) in the study period differed for the subgroups with a first visit to a CCBHC or comparison clinic in DY3 and DY4 (that is, the subgroups with the most time in the COVID-19 period). Overall, the findings suggest no clear pattern of higher or lower COVID-19-related hospital use for the treatment or comparison group across states, but there were some differences in the findings by state (see Appendix A, Section VI):

- In Minnesota, among those with a first visit to a CCBHC or comparison clinic in DY3, a larger percentage of the treatment than the comparison group had COVID-19-related hospital use in the two years after their first visit (1.6 versus 1.3 percent for the first year and 3.1 versus 2.1 percent for the second year). Among those with a first visit to a CCBHC or comparison clinic in DY4, a similar percentage of treatment versus comparison group beneficiaries had COVID-19-related hospital use in the year after the first visit (2.9 versus 3.0 percent).
- In Nevada, among those with a first visit to a CCBHC or comparison clinic in DY3, the treatment group had lower COVID-19-related hospital use than the comparison group in the first year after their first visit (1.3 versus 1.9 percent), but higher use in the second year (3.1 versus 2.7 percent). Among those with a first visit in DY4, a larger percentage of treatment versus comparison group beneficiaries had COVID-19-related hospital use in the year after the first visit (3.6 versus 2.3 percent).
- In Oklahoma, among those with a first visit to a CCBHC or comparison clinic in DY3, treatment and comparison groups had similar rates of COVID-19-related hospital use in the two years after their first visit. Among those with a first visit in DY4, the treatment group had higher use during the baseline period (0.8 versus 0.0 percent) and similar rates in the year after the first visit (1.7 versus 1.6 percent).

Differences between treatment and comparison groups in COVID-19-related hospital use could impact rates of all-cause or physical health–related hospitalizations or ED visits unrelated to the demonstration. Even though we adjusted for time-varying county-level differences in COVID-19 vulnerability and probable deaths, COVID-19 could have affected the treatment and comparison groups differently and the groups may have differed in their susceptibility to COVID-19 in unmeasurable ways. For example, while we matched on a diagnosis of obesity, if one group had a much higher average body mass index – a measure not available in claims data – the beneficiaries in that group might have been more susceptible to adverse effects of COVID-19 and more likely to use hospital care for COVID-19. To the extent that we found differences in physical health–related outcomes for the treatment group relative to the comparison group among the subgroups with a first visit in DY3 and DY4, we accounted for the possibility that such differences were related to COVID-19 when interpreting the findings.

3. Impacts on service use

Summary of impacts on service use. The CCBHC model impacted hospitalizations, ED visits, and ambulatory visits differently in each state. For hospitalizations and ED visits, we measured both the

percentage of beneficiaries with any event and the average number of events. Across the three states and service types, we found the following:

- In Minnesota, the demonstration did not impact hospitalization rates but was associated with higher rates of ED visits. Some of this increase, however, might have been because of higher rates of COVID-19-related service use among people who received care from CCBHCs relative to the comparison group. The demonstration was also associated with increased behavioral health–related ambulatory visits and decreased physical health–related ambulatory visits.
- In Nevada, the demonstration had favorable impacts on all-cause hospitalizations, and there was some evidence of decreasing ED visits among people who received care from CCBHCs relative to the comparison group. The demonstration was also associated with increased ambulatory visits, driven by an increase in behavioral health–related ambulatory visits.
- In Oklahoma, the demonstration had favorable impacts on hospitalization rates, but only for adults and people with SUD. Children and adolescents who received care from CCBHCs had increased all-cause hospitalization rates relative to the comparison group. The demonstration was also associated with an increase in the percentage of beneficiaries with an ED visit, but there was no impact on the average number of ED visits. The demonstration was associated with increased service use for children and adolescents, as measured by hospitalizations and ED visits, which might indicate that CCBHCs in Oklahoma identified unmet needs among this population or that the CCBHCs served children and adolescents that were sicker, on average, in unobservable ways than the comparison group.

Hospitalizations. The demonstration decreased hospitalizations in Nevada and Oklahoma, but the magnitude of impacts varied by state and subgroup (Exhibit IV.4, with full impact results available in Appendix A, Section VII).

- **In Minnesota, the demonstration did not impact hospitalizations.** This finding was consistent across all analyses, including analyses of the number of hospitalizations and the percentage of beneficiaries with any hospitalization as well as analyses of the full population and for subgroups of adults, children and adolescents, people with SUD, and by DY of a beneficiary's first visit.
- **In Nevada, the demonstration was associated with a decrease in hospitalizations.** Among all beneficiaries included in the analysis, there was a 23 percent decrease in hospitalizations (an average reduction of 75 all-cause hospitalizations per 1,000 beneficiaries per year) for people who received care from CCBHCs relative to the comparison group ($p = 0.02$), which was primarily driven by behavioral health–related hospitalizations. In general, the magnitude of the decrease in all-cause hospitalizations and behavioral health–related hospitalizations was larger in the first year after a beneficiary's first visit compared to the second year, possibly suggesting some attenuation of impacts over time. The demonstration was not associated with a change in the percentage of beneficiaries with any hospitalization.

  When we stratified by subpopulation, the demonstration was associated with a decrease in the number of hospitalizations for adults and people with SUD and with a 15 percent decrease in the percentage of

beneficiaries with any hospitalization for people with SUD (p = 0.04).[34] It was also consistently associated with decreases in the number of hospitalizations for subgroups defined by the DY of the beneficiary's first visit, although the decrease was only statistically significant for the subgroup with a first visit in DY4.

The demonstration's favorable impact on all-cause hospitalizations, particularly for adults and people with SUD, might be because of the state's CCBHCs' long-standing experience working with adults and SUD populations before the demonstration (that is, the clinics that became CCBHCs in Nevada provided outpatient and residential SUD treatment before the demonstration but not to adults with mental health conditions or children and families).[35]

- **In Oklahoma, the demonstration was associated with decreased hospitalizations among adults and people with SUD but increased hospitalizations among children.** Among adults and people with SUD, the demonstration was associated with an average of 63 and 112 fewer all-cause hospitalizations per 1,000 beneficiaries per year, respectively, (reflecting 15 and 19 percent decreases, respectively) (p = 0.01 and p = 0.02). For people with SUD (most of whom were adults), the overall impacts on hospitalization rates were driven by a decrease in behavioral health–related hospitalizations. The demonstration was associated with a 16 percent increase in the percentage of beneficiaries with any hospitalization (p < 0.01) and a 20 percent increase in the number of all-cause hospitalizations, reflecting an average increase of 24 all-cause hospitalizations per 1,000 beneficiaries per year (p = 0.03) among children and adolescents who received care from a CCBHC relative to the comparison group. The percentage of beneficiaries with any hospitalization and the number of hospitalizations per 1,000 beneficiaries per year in the baseline and demonstration periods was much lower for children than for adults or people with SUD.

  There was not a statistically significant impact on hospitalizations for the full population of beneficiaries, most likely because the decreased hospitalizations among adults was offset by the increased hospitalizations among children. Nearly two-thirds of Oklahoma beneficiaries included in the analysis were children and adolescents, which strongly influences the impacts for the full population.

[34] In Nevada, about 77 percent of the analysis population were adults, and 58 percent were people with SUD. There was considerable overlap between the adult and SUD subgroups. Specifically, 84 percent of the SUD subgroup were also adults.

[35] Nevada did, however, expand access to children and adolescents during the demonstration period. As shown in Appendix B, the percentage of children and adolescents with a first visit by DY increased from 16 percent in DY1 to 23 percent in DY2 and DY3 before falling back to 19 percent in DY4.

Exhibit IV.4 Impacts on hospitalizations for all beneficiaries and by subgroup

	All beneficiaries	Adults	Children and adolescents	People with SUD	Demonstration year of the first visit (all beneficiaries)			
					DY1	DY2	DY3	DY4
Minnesota								
Number of hospitalizations								
All cause	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact
Behavioral health related	No impact	No impact	No impact	No impact	No impact[a]	No impact	No impact	No impact
Physical health related	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact
Percentage with any hospitalization	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact
Nevada								
Number of hospitalizations								
All cause	**Decreased***	**Decreased***	No impact	**Decreased***	No impact	No impact[b]	No impact	**Decreased*[c]**
Behavioral health related	**Decreased***	**Decreased***	No impact	**Decreased***	No impact	No impact[d]	No impact	**Decreased*[e]**
Physical health related	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact
Percentage with any hospitalization	No impact	No impact	No impact	**Decreased***	No impact	No impact	No impact	No impact
Oklahoma								
Number of hospitalizations								
All cause	No impact	**Decreased***	**Increased***	**Decreased***	No impact	No impact	No impact	No impact
Behavioral health related	No impact	No impact	No impact	**Decreased***	No impact	No impact	No impact	No impact
Physical health related	No impact	No impact[f]	**Increased***	No impact	No impact	No impact	No impact	No impact
Percentage with any hospitalization	No impact	No impact	**Increased****	No impact	No impact	No impact	No impact	No impact

Source: Mathematica's analyses of Minnesota, Nevada, and Oklahoma TAF data, 2015 to 2021.

Note: This table summarizes cumulative impact estimates over months 1 to 24 following the first visit to a CCBHC or comparison clinic. Impact estimates for beneficiaries with a first visit in DY4 reflect impacts over months 1 to 12 (the only full year of data available for this subgroup). The CCBHC demonstration started on July 1, 2017 in Minnesota and Nevada, and on April 1, 2017 in Oklahoma. In Minnesota and Nevada, DY1 spans July 1, 2017 to June 30, 2018; DY2 spans July 1, 2018 to June 30, 2019; DY3 spans July 1, 2019

to June 30, 2020; DY4 spans July 1, 2020 to June 30, 2021. The DY4 cohort includes only beneficiaries with a first visit date between July 1, 2020 and December 31, 2020, due to data availability. In Oklahoma, DY1 spans April 1, 2017 to March 31, 2018; DY2 spans April 1, 2018 to March 31, 2019; DY3 spans April 1, 2019 to March 31, 2020; DY4 spans April 1, 2020 to March 31, 2021. The DY4 cohort includes only beneficiaries with a first visit date between April 1, 2020 and December 31, 2020, also due to data availability.

[a] This result is sensitive to specification. When we truncated the number of hospitalizations at the 99th percentile, the treatment group had a significant *increase* in hospitalizations relative to the comparison group (p = 0.03).

[b] This result is sensitive to specification. When we truncated the number of hospitalizations at the 99th percentile, the treatment group had a significant *decrease* in hospitalizations relative to the comparison group (p = 0.03).

[c] This result is sensitive to specification. When we used a two-year baseline period, we found no statistically significant impact.

[d] This result is sensitive to specification. When we truncated the number of hospitalizations at the 99th percentile, the treatment group had a significant *decrease* in behavioral health–related hospitalizations relative to the comparison group (p = 0.03).

[e] This result is sensitive to specification. When we truncated the data at the 99th percentile, we found *no statistically significant impact*.

[f] This result is sensitive to specification. When we truncated the number of hospitalizations at the 99th percentile, the treatment group had a statistically significant *decrease* in hospitalizations relative to the comparison group (p = 0.03).

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

CCBHC = Certified Community Behavioral Health Clinic; DY = demonstration year; SUD = substance use disorder; TAF = Transformed Medicaid Statistical Information System Analytic Files.

ED visits. The demonstration impacted ED visits in all states, but the direction and statistical significance of the findings varied across states and by subpopulations within states (Exhibit IV.5, with full impact results available in Appendix A, Section VII).

- **In Minnesota, the demonstration was associated with an increase in ED visits, but this was driven mainly by ED visits for physical health conditions.** Among all beneficiaries included in the analysis, the demonstration was associated with a 3 percent increase in the percentage of beneficiaries with any ED visit, and an average increase of 87 all-cause ED visits per 1,000 beneficiaries per year for people who received care from CCBHC relative to the comparison group ($p < 0.01$ for both comparisons). There was, however, no impact on behavioral health–related ED visits for the full population. Rather, the increase in the average number of ED visits was driven by an increase in physical health–related ED visits among beneficiaries with a first visit to a CCBHC in DY3 relative to the comparison group; these CCBHC clients experienced an 8 percent increase in any ED visits ($p < 0.01$) and a 20 percent increase in physical health–related ED visits ($p < 0.01$) relative to the comparison group. DY3 corresponds to the peak of the COVID-19 pandemic. As we described, a larger percentage of treatment than comparison group beneficiaries in this subgroup had COVID-19-related hospital use in the follow-up period, which could partially or fully explain the higher rates of all-cause and physical health–related ED visits for people who received care from CCBHCs.[36]

  For children and adolescents, the demonstration was associated with an average increase of 69 all-cause ED visits ($p < 0.01$) and an average increase of 34 behavioral health–related ED visits ($p < 0.01$) per 1,000 beneficiaries among those who received care from a CCBHC relative to the comparison group.
- **In Nevada, the demonstration was not associated with a statistically significant impact on ED visits, but there was some evidence of decreasing ED visits among people who received care from CCBHCs.** Although the findings were not statistically significant, the direction of the impact estimates suggested all-cause, behavioral health–related, and physical health–related ED visits decreased for CCBHC clients relative to the comparison group over the two-year follow-up period.[37] Further, the sensitivity analysis using a two-year baseline period rather than a one-year period suggested the demonstration was associated with an average decrease of 115 behavioral health–related ED visits per 1,000 beneficiaries per year for people who received care from CCBHCs relative to the comparison group, reflecting an 18 percent decrease ($p = 0.03$).
- **In Oklahoma, the demonstration was associated with an increase in the percentage of beneficiaries with any ED visit among all beneficiaries and an increase in the average number of ED visits among children and adolescents.** The demonstration was associated with about a 7 percent increase in the percentage of beneficiaries with any ED visit among CCBHC clients relative to the comparison group. This finding was consistent across all subgroups as well as for the first and second years following the first visit to a CCBHC or comparison clinic among the full population. Among children and adolescents, the demonstration was associated with an average increase of 80 all-cause ED

[36] In contrast, the demonstration was associated with a 2 percent or less increase in any ED visit for beneficiaries with a first visit in DY1, DY2, or DY4 (all not statistically significant at $p < 0.05$).

[37] This was not true for the percentage with any ED visit, for which the impact estimates indicated no impact over the full two-year period and separately by year since the first visit.

visits per 1,000 beneficiaries per year for people who received care from CCBHCs relative to the comparison group, representing a 12 percent increase ($p < 0.01$). Relative to the comparison group, children and adolescents who received care from CCBHCs experienced statistically significant increases in physical health–related and behavioral health–related ED visits during the two-year follow-up period (an average increase of 54 physical health–related ED visits per 1,000 beneficiaries per year [$p = 0.01$], and 26 behavioral health–related ED visits per 1,000 beneficiaries per year [$p < 0.01$]). The demonstration also had a statistically significant impact on the average number of all-cause and physical health–related ED visits among beneficiaries who first visited a CCBHC or comparison clinic in DY3, which corresponds to the COVID-19 pandemic. As we previously noted, however, the treatment and comparison groups corresponding with this period had similar rates of COVID-related hospitalizations or ED visits. Finally, among all beneficiaries with a SUD, the demonstration was associated with an average decrease of 215 physical health–related ED visits per 1,000 beneficiaries per year, a 12 percent decrease ($p = 0.04$).

Exhibit IV.5. Impacts on ED visits for all beneficiaries and by subgroup

					Demonstration year of the first visit (all beneficiaries)			
	All beneficiaries	Adults	Children / adolescents	People with SUD	DY1	DY2	DY3	DY4
Minnesota								
Number of ED visits								
All-cause	**Increased****	No impact[a]	**Increased****	No impact	No impact	No impact	No impact[b]	No impact
Behavioral health-related	No impact[c]	No impact[d]	**Increased****	No impact	No impact	**Increased*[e]**	No impact	No impact
Physical health-related	**Increased***	No impact	No impact	**Increased*[f]**	No impact	No impact	**Increased****	No impact
Percentage with any ED visit	**Increased****	**Increased***	No impact	No impact	No impact	No impact	**Increased****	No impact
Nevada								
Number of ED visits								
All-cause	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact
Behavioral health-related	No impact[g]	No impact	No impact	No impact	No impact	No impact	No impact	No impact[g]
Physical health-related	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact
Percentage with any ED visit	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact
Oklahoma								
Number of ED visits								
All-cause	No impact[h]	No impact	**Increased*****	No impact	No impact	No impact	**Increased****	No impact
Behavioral health-related	No impact	No impact	**Increased****	No impact	No impact	No impact	No impact	No impact
Physical health-related	No impact	No impact	**Increased***	**Decreased***	No impact	No impact	**Increased****	No impact
Percentage with any ED visit	**Increased*****	**Increased****	**Increased*****	**Increased***	**Increased***	**Increased***	**Increased***	**Increased****

Source: Mathematica's analyses of Minnesota, Nevada, and Oklahoma TAF data, 2015 to 2021

Note: This table summarizes cumulative impact estimates over months 1 to 24 following the first visit to a CCBHC or comparison clinic. Impact estimates for beneficiaries with a first visit in demonstration year four reflect impacts over months 1 to 12 (the only full year of data available for this subgroup). The CCBHC demonstration started on July 1, 2017 in Minnesota and Nevada, and on April 1, 2017 in Oklahoma. In Minnesota and Nevada, DY1 spans July 1, 2017 to June 30, 2018; DY2 spans July 1, 2018 to June 30, 2019; DY3 spans July 1, 2019 to June 30, 2020; DY4 spans July 1, 2020 to June 30, 2021. The DY4 cohort includes only beneficiaries with a first visit date between July 1, 2020 and

December 31, 2020, due to data availability. In Oklahoma, DY1 spans April 1, 2017 to March 31, 2018; DY2 spans April 1, 2018 to March 31, 2019; DY3 spans April 1, 2019 to March 31, 2020; DY4 spans April 1, 2020 to March 31, 2021. The DY4 cohort includes only beneficiaries with a first visit date between April 1, 2020 and December 31, 2020, also due to data availability.

[a] Result sensitive to specification. When we truncated the number of all-cause ED visits at the 99th percentile, the treatment group had a significant *increase* in the number of such ED visits versus comparison group ($p = 0.03$).

[c] This result is sensitive to specification. When we truncated the number of behavioral health ED visits at the 99th percentile, the treatment group had a significant *increase* in the number of such ED visits versus comparison group ($p < 0.01$).

[d] This result is sensitive to specification. When we truncated the number of behavioral health-related ED visits at the 99th percentile, the treatment group had a significant *increase* in the number of such ED visits relative to the comparison group ($p = 0.04$).

[e] This result is sensitive to specification. When we truncated the number of behavioral health-related ED visits at the 99th percentile or used a two-year baseline period, we found no impact on behavioral health-related ED visits.

[f] This result is sensitive to specification. When we truncated the number of physical health-related ED visits at the 99th percentile, we found no impact.

[g] This result is sensitive to specification. When we used a two-year baseline period, the treatment group had a significant *decrease* in the number of behavioral health-related ED visits relative to the comparison group ($p = 0.03$ for all beneficiaries and $p=0.02$ for beneficiaries with a first visit in DY 4).

[h] Result sensitive to specification. When we truncated the number of all-cause ED visits at the 99th percentile, the treatment group had a significant *increase* in the number of such ED visits relative to the comparison group ($p = 0.04$).

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

CCBHC = Certified Community Behavioral Health Clinic; DY = demonstration year; ED = emergency department; SUD = substance use disorder; TAF = Transformed Medicaid Statistical Information System Analytic Files

Ambulatory visits.[38] The demonstration increased behavioral health–related ambulatory visits in Minnesota and Nevada, but findings related to physical health–related ambulatory visits and subgroups differed by state.[39] (See Exhibit IV.6, with full impact results available in Appendix A, Section VII.)

- **In Minnesota, the demonstration was associated with an increase in behavioral health–related ambulatory visits but a decrease in physical health–related ambulatory visits.** The demonstration was associated with an average increase of 1,225 behavioral health–related ambulatory visits per 1,000 beneficiaries per year among people who received care from CCBHC relative to the comparison group (representing a 4 percent increase) ($p < 0.01$) but an average decrease of 793 physical health–related ambulatory visits per 1,000 beneficiaries per year (representing a 6 percent decrease) ($p < 0.01$). These findings varied across DYs and might have been driven by children and adolescents.
- **In Nevada, the demonstration was associated with an increase in behavioral health–related ambulatory visits and no change in physical health–related ambulatory visits.** The demonstration was associated with an average increase of 3,442 behavioral health–related ambulatory visits per 1,000 beneficiaries per year among people who received care from CCBHCs relative to the comparison group (representing a 19 percent increase) ($p < 0.01$), driving similar increases in the average number of all-cause ambulatory visits. There was no change in physical health–related ambulatory visits for CCBHC clients relative to the comparison group.

[38] Visits to CCBHCs are captured in ambulatory visits.

[39] We did not calculate ambulatory visits in Oklahoma (the only PPS-2 state in the impact analysis) because CCBHCs received a monthly payment for each beneficiary to whom they provided services during any calendar month. Thus, CCBHCs only needed to submit one claim per beneficiary per month during the demonstration period to receive a PPS payment for the month, and we therefore cannot reliably observe every daily visit to these CCBHCs.

Exhibit IV.6. Impacts on ambulatory visits for all beneficiaries and by subgroup

					Demonstration year of the first visit (all beneficiaries)			
	All beneficiaries	**Adults**	**Children / adolescents**	**People with SUD**	**DY1**	**DY2**	**DY3**	**DY4**
Minnesota								
Number of ambulatory visits								
All-cause	No impact	No impact	No impact	No impact	No impact	**Increased****	No impact	No impact
Behavioral health-related	**Increased****	No impact	**Increased****	No impact	No impact	**Increased****	No impact	No impact
Physical health-related	**Decreased****	No impact	**Decreased****	No impact	**Decreased****	No impact	**Decreased***	No impact
Nevada								
Number of ambulatory visits								
All-cause	**Increased*****	**Increased*****	No impact	**Increased*****	**Increased*****	No impact	**Decreased*[a]**	**Increased****
Behavioral health-related	**Increased*****	**Increased*****	No impact	**Increased*****	**Increased*****	No impact	**Decreased*[a]**	**Increased****
Physical health-related	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact

Source: Mathematica's analyses of Minnesota and Nevada TAF data, 2015 to 2021

Note: This table summarizes cumulative impact estimates over months 1 to 24 following the first visit to a CCBHC or comparison clinic. Impact estimates for beneficiaries with a first visit in DY4 reflect impacts over months 1 to 12 (the only full year of data available for this subgroup). The CCBHC demonstration started on July 1, 2017 in Minnesota and Nevada, and on April 1, 2017 in Oklahoma. In Minnesota and Nevada, DY1 spans July 1, 2017 to June 30, 2018; DY2 spans July 1, 2018 to June 30, 2019; DY3 spans July 1, 2019 to June 30, 2020; DY4 spans July 1, 2020 to June 30, 2021. The DY4 cohort includes only beneficiaries with a first visit date between July 1, 2020 and December 31, 2020, due to data availability. In Oklahoma, DY1 spans April 1, 2017 to March 31, 2018; DY2 spans April 1, 2018 to March 31, 2019; DY3 spans April 1, 2019 to March 31, 2020; DY4 spans April 1, 2020 to March 31, 2021. The DY4 cohort includes only beneficiaries with a first visit date between April 1, 2020 and December 31, 2020, also due to data availability.

[a] This result is sensitive to specification. When we used a two-year baseline period, we found no impact on all-cause ambulatory visits.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

CCBHC = Certified Community Behavioral Health Clinic; DY = demonstration year; SUD = substance use disorder; TAF = Transformed Medicaid Statistical Information System Analytic Files.

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V. Demonstration Impacts on Quality Measures

We used Medicaid TAF data to examine the demonstration's impact on quality of care for several claims-based quality measures (Exhibit V.1).[40] For these analyses, we selected claims-based CCBHC demonstration quality measures applicable to the broadest populations.

Exhibit V.1. Quality measures included in the impact analyses

Measure	Description	Adults	Children and adolescents
Antidepressant Medication Management (AMM)	Assesses the percentage of people with major depression who remain on antidepressant for at least 12 weeks (acute phase) and 6 months (continuation phase)	X	
Adherence to Antipsychotics for Individuals with Schizophrenia (SAA)	Assesses the percentage of people with schizophrenia and schizoaffective disorder who remain on antipsychotic medication for at least 80 percent of time in treatment	X	
Follow-up After Hospitalization for Mental Illness (FUH-AD and FUH-CH)	Assesses the percentage of hospital discharges for people hospitalized for mental illness or intentional self-harm where there was a follow-up visit with a mental health provider within 7 or 30 days after discharge	X	X[a]
Follow-up After Emergency Department Visit for Mental Illness (FUM-AD and FUM-CH)	Assess the percentage of ED visits for people seen for mental illness or intentional self-harm where there was a follow-up visit for mental illness within 7 or 30 days after the ED visit	X	X[a]
Follow-up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (FUA-AD and FUA-CH)	Assesses the percentage of ED visits for people seen for alcohol or other drug abuse or dependence where there was a follow-up up visit for alcohol use or other drug abuse or dependence within 7 or 30 days after the ED visit	X	X[b]

[a] This measure is limited to children and adolescents ages 6 to 17.

[b] This measure is limited to children and adolescents ages 13 to 17.

ED = emergency department.

In Oklahoma, the demonstration was associated with statistically significant improvements on antidepressant management. In addition, there were improvements over time on all three follow-up measures for CCBHC clients in Minnesota and Nevada, but improvements were not statistically different from the comparison group. (See Exhibit VI.2, with detailed methods description in Appendix A, Section IV and full results in Appendix A, Section VII.) As described in this section, these findings should be interpreted cautiously because of the limitations of these analyses. Findings reflect the subset of

[40] Baseline rates of the quality measures constructed using TAF were generally consistent with the CCBHC quality measures that Minnesota and Oklahoma reported (Nevada did not report quality measures). For example, in CCBHC quality measure reports, the 30-day rate of follow-up after hospitalization for mental illness that Minnesota reported ranged from 60 to 65 percent annually during the demonstration period (Wishon et al. 2023). In the TAF analyses, the treatment group baseline rate was 67 percent. The exception was the baseline rate of adherence to antipsychotics for individuals with schizophrenia in Oklahoma. In the quality reports, the rate in Oklahoma ranged from 28 to 33 percent between DY1 and DY4, but, in the TAF-based analyses, the baseline rate was 65 percent.

beneficiaries or events (hospitalizations or ED visits) that met the denominator criteria for the relevant measure and not the full population of beneficiaries that CCBHCs and comparison clinics served. [41] Findings might reflect other efforts in the states to improve the quality of care that similarly affected CCBHCs and comparison clinics, given that the findings generally indicated improvements over time for both groups.

Medication management and adherence measures

Antidepressant medication management. In Oklahoma, the demonstration was associated with favorable impacts on AMM. A larger percentage of CCBHC clients than comparison group beneficiaries who met criteria for the measure in the year after their first visit remained on antidepressants for at least 12 weeks following the initial prescription fill (the acute phase) (42 versus 35 percent; $p = 0.02$) and for at least six months following the initial prescription fill (the continuation phase) (21 versus 16 percent; $p = 0.03$), representing impacts of 18 and 29 percent, respectively. Although there were no significant impacts during the acute phase in Nevada, 55 percent of the treatment group who met the denominator criteria remained on antidepressant medications versus 50 percent of the comparison group ($p = 0.35$). The percentage of treatment and comparison group beneficiaries who remained on antidepressant medications during the continuation phase was the same for both groups (28 percent). In Minnesota, the percentage of people who remained on antidepressants was similar for treatment and comparison groups for both the acute and continuation phases.

Adherence to antipsychotics. The demonstration was not associated with impacts on adherence to antipsychotics among people with schizophrenia or schizoaffective disorder in any state included in our analysis. In interviews, several demonstration state officials commented on how the specifications for the measure could limit the ability to detect changes in the quality of care over time. For example, one official suggested that the list of medications included in the specifications might not be updated frequently enough to capture new formulations and medications.[42] This could compromise the ability to detect improvements for CCBHC clients relative to the comparison group if CCBHCs and comparison clinics differ in their prescribing practices.

Follow-up measures

We also examined several measures of follow-up care in Minnesota and Nevada.[43] Although the demonstration was not associated with impacts on follow-up measures, both treatment and comparison groups improved on these measures over time.

[41] To account for the smaller sample sizes, we present results only for the full analysis population in each state in this chapter. We also describe measures for which the treatment group improved either similarly or more so than the comparison group, even if they were not statistically significant.

[42] We interpreted this to mean that any newly available antipsychotic drugs or formulations prescribed in a year would not get counted toward the numerator until the measure steward updates the list of antipsychotic medications included in the measure.

[43] We did not construct follow-up measures in Oklahoma because of the payment option in the state (PPS-2). Because CCBHCs in PPS-2 states need only submit one claim per beneficiary per month to receive payment for services provided in a month, claims data would likely undercount follow-up during the demonstration period.

Follow-up after hospitalization for mental illness. The demonstration was not associated with impacts on follow-up after hospitalization for mental illness. In Minnesota and Nevada, however, there was a small improvement in 30-day follow-up rates among people who received care from CCBHCs and a slightly larger but not statistically significant increase in 30-day follow-up for the comparison group.

Follow-up after ED visits for mental illness and alcohol and drug abuse or dependence. In Minnesota and Nevada, CCBHC clients and the comparison group experienced similar improvements in 30-day follow-up after ED visits for mental illness and ED visits for alcohol or other drug abuse or dependence. For example, in Minnesota, 67 percent of ED visit for mental illness among CCBHC clients had a follow-up visit within 30 days during the baseline period, which increased to 75 percent during the demonstration. Likewise, among the comparison group, 68 percent of ED visits for mental illness had a follow-up visit within 30 days during the baseline period, which increased to 76 percent during the demonstration. Both groups demonstrated an 8 percentage point increase in follow-up rates over time.

Exhibit VI.2. Impacts on quality measures among all eligible beneficiaries, by state

	Minnesota	Nevada	Oklahoma
Medication management and adherence measures			
Antidepressant Medication Management (AMM)			
Acute phase	No impact	No impact	**Increased*[a]**
Continuation phase	No impact	No impact	**Increased*** [a]
Adherence to Antipsychotics for Individuals with Schizophrenia (SAA)	No impact	No impact	No impact
Follow-up measures			
Follow-up After Hospitalization for Mental Illness (FUH-AD and FUH-CH)			
7-day follow-up	No impact	No impact	n.a.
30-day follow-up	No impact	No impact	n.a.
Follow-up After ED Visit for Mental Illness (FUM-AD and FUM-CH)			
7-day follow-up	No impact[b]	No impact[b]	n.a.
30-day follow-up	No impact[b]	No impact[b]	n.a.
Follow-up After ED Visit for Alcohol and Other Drug Abuse or Dependence (FUA-AD and FUA-CH)			
7-day follow-up	No impact[b]	No impact[b]	n.a.
30-day follow-up	No impact[b]	No impact[b]	n.a.

Source: Mathematica analyses of Minnesota, Nevada, and Oklahoma TAF data, 2016 – 2021.

Note: The findings reflect cumulative impacts over months 1 to 24 for all beneficiaries (for SAA) and for all hospitalizations or ED visits (for the follow-up measures) eligible for the measure denominator. The follow-up measures require assessing the delivery of care within seven and 30 days following each qualifying hospitalization or ED visit. For AMM, the findings are based on cross-sectional analyses of differences between treatment and comparison groups in the first year after the first visit. We did not assess the impacts of the demonstration on the follow-up measures in Oklahoma because the state reimburses CCBHCs using the PPS-2 model. Because CCBHCs in PPS-2 states are reimbursed for services based on the submission of a single monthly claim per beneficiary, claims data available through TAF would likely undercount the delivery of follow-up care provided by CCBHCs during the demonstration period.

[a] Increased performance for the treatment group on this measure indicates statistically significant improvement in measure performance for the CCBHC group relative to the comparison group during the demonstration period.

[b] Performance on this measure improved by five percentage points or more between the baseline and demonstration period for the treatment group. The comparison group generally made similar improvements over time, suggesting that there might have been other statewide efforts to improve quality that affected performance of both CCBHCs and comparison clinics. See Appendix Exhibits A.VII.6 and A.V.II.7 for full data for Minnesota and Nevada, respectively.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

CCBHC = certified community behavioral health clinic; ED = emergency department; n.a. = not applicable; TAF = Transformed Medicaid Statistical Information System Analytic Files.

VI. Demonstration Impacts on Costs

The impact analyses assessed how the demonstration affected total Medicaid costs and costs by service type in Nevada and Oklahoma.[44] In both states, total costs increased significantly more for the treatment group than the comparison group during the demonstration period, driven in large part by increased costs for ambulatory visits, which include visits to CCBHCs.

In Nevada, the demonstration was associated with increased total costs for people who received care from CCBHCs relative to the comparison group, primarily driven by increased costs for behavioral health–related ambulatory visits. The demonstration was associated with a borderline statistically significant increase in average total costs of $132 per beneficiary per month for CCBHC clients relative to the comparison group ($p = 0.05$). (See Exhibit VI.1, with full findings in Appendix A, Section VII.) This reflected an increase in average total costs per beneficiary per month from $621 in the baseline period to $891 over the two-year follow-up period for CCBHC clients and an increase from $828 to $966 for the comparison group over the same period. In other words, average total costs increased over time for both groups but increased more for CCBHC clients than for the comparison group. When we truncated costs at the 99th percentile to remove beneficiaries with extremely high costs, the demonstration was associated with an increase in average costs of $98 per beneficiary per month ($p < 0.01$). The demonstration was also associated with decreased costs for behavioral health–related hospitalizations, but not enough to offset the increased ambulatory costs.

Most of the increased costs in Nevada were for ambulatory behavioral health care. This finding aligns with the increase in behavioral health–related ambulatory visits observed for CCBHC clients in Nevada (See Chapter IV). The demonstration was associated with an average increase of $109 per beneficiary per month for all-cause ambulatory visits ($p < 0.01$) for the treatment group relative to the comparison group. This reflected an increase in average all-cause ambulatory costs per beneficiary per month from $155 to $402 for the treatment group and $177 to $315 for the comparison group. The change in all-cause ambulatory costs was almost entirely attributable to costs for ambulatory behavioral health visits. In other words, the demonstration was associated with an average $119 per beneficiary per month increase in behavioral health-related ambulatory costs for the treatment group ($p < 0.01$) but no statistically significant change in costs for physical health–related ambulatory visit costs.

The demonstration was associated with an average decrease of $54 per beneficiary per month for behavioral health–related hospitalizations ($p = 0.03$), but otherwise there were no statistically significant impacts on costs for all-cause hospitalizations, physical health–related hospitalizations, or any type of ED-related costs.

[44] We limited analyses in Nevada to beneficiaries with a first visit on or after January 1, 2018, because of the poor quality of payment data on managed care encounter records in earlier years. We also report for the full population of beneficiaries in Nevada only (that is, not by subgroups) to avoid any risk of disclosing proprietary managed care plan data. Oklahoma used both fee-for-service and managed care arrangements for Medicaid beneficiaries during our study period, meaning that our cost analyses include both types of payments in all years.

Exhibit VI.1. Summary of impacts on costs for all beneficiaries: Nevada

	All beneficiaries
Total Medicaid costs	No impact[b]
Behavioral health-related	No impact
Physical health-related	No impact
Medicaid costs by service type	
Inpatient costs	
All-cause	No impact
Behavioral health-related	**Decreased***
Physical health-related	No impact
Emergency department visit costs	
All-cause	No impact
Behavioral health-related	No impact
Physical health-related	No impact
Ambulatory visit costs	
All-cause	**Increased*****
Behavioral health-related	**Increased*****
Physical health-related	No impact

Source: Mathematica analyses of Nevada TAF data, 2017 - 2021

Note: This table describes the cumulative impact estimates over months 1 to 24 following the first visit to the CCBHC or comparison clinic for all beneficiaries. Nevada used both fee-for-service and managed care arrangements during our study period. In descriptive analyses, we found the payment data on managed care encounter records was usable from 2017 onwards. For this reason, we implemented cost analyses only among treatment and comparison beneficiaries with a first visit on or after January 1, 2018 (to include a full year of baseline cost data for beneficiaries with a first visit in 2018). Treatment and comparison beneficiaries enrolled in managed care plans in any year were enrolled across multiple plans. Approximately 40 percent of beneficiaries in the analysis population were enrolled in managed care plans at the time of their first visit with the remainder covered under fee-for-service. However, to guard against accidentally reporting proprietary managed care payment data, we report impacts on costs for the full analysis population only, which includes beneficiaries covered by managed care as well as fee-for-service arrangements.

[a] Including beneficiaries with a first visit on or after January 1, 2018

[b] Results sensitive to specification. When we truncated total costs at the 99th percentile, the treatment group had significantly increased costs relative to the comparison group.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

TAF = T-MSIS Analytic Files

In Oklahoma, the demonstration was associated with increased total costs for CCBHC clients relative to the comparison group, primarily driven by increased costs for behavioral health–related ambulatory visits. (See Exhibit VI.2 with full findings in Appendix A, Section VII.) The demonstration was associated with an average increase of $208 per beneficiary per month in total average costs ($p < 0.01$), driven by an average increase of $201 per beneficiary per month in behavioral health–related ambulatory costs ($p < 0.01$). Impacts on total costs reflected an increase in average costs from baseline to follow-up periods of $743 to $1,063 per beneficiary per month for the treatment group versus an increase of $737 to $850 over the same period for the comparison group. This pattern was generally consistent across the

adult, children and adolescents, and SUD subgroups as well as the subgroups defined by DY of the first visit. Still, there were some findings specific to subgroups. For example, among adults, the demonstration was associated with decreased total hospital costs for CCBHC clients relative to the comparison group (an average decrease of $49 per beneficiary per month; $p < 0.01$), reflecting decreases in behavioral health–related ($27 per beneficiary per month; $p = 0.06$) and physical health–related ($22 per beneficiary per month; $p = 0.04$) hospital costs. Further, the demonstration was associated with an average $7 per beneficiary per month increase to all-cause ED costs for CCBHC clients relative to the comparison group among beneficiaries who had their first visit in DY3 ($p = 0.01$), which was nearly all concentrated among physical health–related ED costs. This latter finding was consistent with the increase in the number of physical health–related ED visits for the treatment group relative to the comparison group in this subgroup (See Chapter IV) and might reflect differences in ED use and costs between treatment and comparison groups related to the COVID-19 pandemic.

Exhibit VI.2. Impacts on costs for the full analysis population and by subgroups: Oklahoma

	All beneficiaries	Adults	Children and adolescents	People with SUD	Demonstration year of the first visit for all beneficiaries			
					DY1 (7/1/17 – 6/30/18)	DY2 (7/1/18 – 6/30/19)	DY3 (7/1/19 – 6/30/20)	DY4 (7/1/20 – 12/31/20)
Total Medicaid costs	**Increased*** **	**Increased*** **	**Increased*** **	No impact	**Increased*** **	**Increased*** **	**Increased*** **	**Increased*** **
Behavioral health related	**Increased*** **	**Increased*** **	**Increased*** **	**Increased***	**Increased*** **	**Increased*** **	**Increased*** **	**Increased*** **
Physical health related	No impact	No impact	Increased*	No impact	No impact	No impact	Increased**	No impact
Costs by service type								
Inpatient costs								
All cause	No impact	**Decreased****	No impact	No impact	No impact	No impact	No impact	No impact
Behavioral health related	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact
Physical health related	No impact	**Decreased***	No impact	No impact	No impact	No impact	No impact	No impact
Emergency department visit costs								
All cause	No impact	No impact	No impact	No impact	No impact	No impact	**Increased***	No impact
Behavioral health related	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact
Physical health related	No impact	No impact	No impact	No impact	No impact	No impact	**Increased****	No impact
Ambulatory visit costs								
All cause	**Increased*** **	**Increased*** **	**Increased*** **	**Increased*** **	**Increased*** **	**Increased*** **	**Increased*** **	**Increased*** **
Behavioral health related	**Increased*** **	**Increased*** **	**Increased*** **	**Increased*** **	**Increased*** **	**Increased*** **	**Increased*** **	**Increased*** **
Physical health related	**Increased*** **	No impact	**Increased*** **	**Increased***	No impact	**Increased****	**Increased***	No impact

Source: Mathematica's analyses of Oklahoma TAF data, 2015 to 2021.

Note: This table summarizes cumulative impact estimates over months 1 to 24 following the first visit to a CCBHC or comparison clinic. Impact estimates for beneficiaries with a first visit in demonstration year four reflect impacts over months 1 to 12 (the only full year of data available for this subgroup).

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

CCBHC = Certified Community Behavioral Health Clinic; DY = demonstration year; SUD = substance use disorder; TAF = Transformed Medicaid Statistical Information System Analytic Files.

VII. Conclusions and Future Evaluation Activities

Section 223 of PAMA mandates that HHS' reports to Congress include (1) an assessment of access to community-based mental health services under Medicaid in the area or areas of a state targeted by a demonstration program as compared to other areas of the state, (2) an assessment of the quality and scope of services provided by CCBHCs as compared to community-based mental health services provided in states not participating in a demonstration program and in areas of a demonstration state that are not participating in the demonstration, and (3) an assessment of the impact of the demonstration on the federal and state costs of a full range of mental health services (including inpatient, emergency, and ambulatory services). Here we summarize the main findings in each of these areas and describe future evaluation activities that will shed further light on them.

A. Access to care

The number of CCBHCs across demonstration states has expanded over time, and states plan to add more clinics in the future. As of May 2024, four of the eight demonstration states included in this report certified additional CCBHCs in response to guidance from HHS allowing these states to add new CCBHCs to their demonstration programs, expanding the number of demonstration CCBHCs from 77 in June 2023 to 106 in May 2024. Four demonstration states were exploring opportunities to certify additional demonstration clinics, and two others may expand the number of CCBHCs through other Medicaid options. Two other states did not have plans to add demonstration clinics because the demonstration is already operating statewide.

The number of people CCBHCs served each year has increased steadily over time in the original demonstration states. CCBHCs in Kentucky and Michigan served more people in the first DY than these states anticipated. Across the original demonstration states, the unduplicated number of people served by CCBHCs increased from 286,089 in DY1 to 340,334 in DY5.[45] With few exceptions, client age, gender, race and ethnicity, and insurance status were consistent across years in the original demonstration states. CCBHCs in Kentucky served 79,967 people (46 percent more than anticipated) and Michigan served 82,280 (27 percent more than anticipated) people in their first DY. The characteristics of people CCBHCs served generally aligned with the expectations of state officials, and most states reported reaching new and underserved populations. State officials attributed growth in the number of people CCBHCs served to efforts to engage new people and specific populations in care. For example, Oklahoma officials reported CCBHCs have been able to increase the number of people in their highest-need population, including people who have high rates of hospitalizations, ED visits, and use of crisis services. States credited certain features of the CCBHC model as helping grow the number of people CCBHCs serve, including the PPS and certification requirements for access to care, services, and community partnerships. Officials in a few states described some populations as more difficult to engage in CCBHC services than others, however, most often reporting challenges engaging children and adolescents, veterans, and older adults.

[45] The number of clinics for which data are available varies from year to year because some clinics were not certified continuously or data were missing for some clinics in some years.

The introduction of the CCBHC model affected the use of services differently across Minnesota, Oklahoma, and Nevada. In Nevada, the demonstration was associated with a reduction in hospitalizations for the full population of CCBHC clients and among adults and people with SUDs, mainly driven by a reduction in behavioral health-related hospitalizations. The demonstration also reduced ED visits. In Oklahoma, the demonstration was also associated with a reduction in hospitalizations among adults and people with SUDs (also driven by a reduction in behavioral health-related hospitalizations), but children and adolescents who received care from CCBHCs had a higher likelihood of all-cause hospitalizations relative to the comparison groups. The demonstration was also associated with a higher likelihood of an ED visit for all CCBHC clients, and an increase in ED visits for children and adolescents. CCBHCs in Oklahoma may have served children/adolescents who were sicker than the comparison group or could have done a better job of identifying problems that required a higher level of care. Finally, there were no impacts on hospitalizations in Minnesota but the demonstration was associated with an increase in ED visits. This increased might have been driven by higher rates of COVID-19 among CCBHC clients in the third demonstration year. In Minnesota and Nevada the demonstration increased behavioral health ambulatory visits with mixed findings on physical health-related ambulatory visits.[46]

The favorable impacts on hospitalizations and ED visits in Nevada and Oklahoma highlight the potential of the demonstration to improve outcomes for people who received care from CCBHCs. However, the variation in findings across states could reflect differences in model implementation or the populations served by CCBHCs. There could also be state-specific challenges to detecting impacts. Changes in state policies to expand behavioral health services to all residents or to all Medicaid-covered beneficiaries during the demonstration also might have made detecting impacts more difficult. For example, Minnesota officials reported enactment of a statewide SUD reform package in 2017 that could have made non-CCBHC behavioral health clinics more similar to CCBHCs by providing coverage statewide for peer recovery support services and withdrawal management. This could have reduced our chances of finding significant impacts of the demonstration on measures of service use, particularly among the SUD population. In some states, the rates of COVID-19-related hospitalizations and ED visits also differed between CCBHC clients and the comparison group, which could influence the ability of the demonstration to impact outcomes.

The variation in findings across states is consistent with findings from previous analyses of the demonstration's impacts on service use during the first two years of the demonstration (Brown et al. 2021). While the design of the analyses, states, and years included differed and therefore cannot be directly compared, we found similar variation across states in the impact of the demonstration. That is, we found no consistent patterns in the demonstration's impacts on hospitalizations, ED visits, or ambulatory visits, and the introduction of the CCBHC model impacted the use of Medicaid services differently in each state. However, there also were similarities in the findings across studies in Oklahoma.[47] In both studies, we found the demonstration was not associated with statistically significant impacts on the number of hospitalizations among all beneficiaries, but there was some evidence suggesting the demonstration was

[46] We did not analyze impacts on ambulatory visits in Oklahoma because the claims data used for this analysis would likely undercount the delivery of follow-up care provided by CCBHCs during the demonstration period under the PPS-2 model used by the state.

[47] Oklahoma was the only state included in both analyses.

associated with decreased hospitalizations, either in sensitivity analyses (previous analysis) or subgroup analyses (current analysis). The demonstration also was associated with a statistically significant increase in the likelihood of any ED visit for the treatment relative to the comparison group in both studies.

B. Quality

Performance on some quality measures improved over time, but most of these improvements were not statistically different than the comparison group in the three states included in the impact analysis. The demonstration was associated with favorable impacts on antidepressant medication management in Oklahoma. Although the demonstration did not impact any of the other quality measures, there were some improvements over time for CCBHC clients that were not statistically different from the comparison group**.** For example, rates of 30-day follow-up after ED visits for mental illness and alcohol and drug dependence improved over time in Minnesota and Nevada, but they did so similarly for CCBHC clients and comparison groups.[48]

> *"…[CCBHCs are] "looking at issues that many of our [non-CCBHC] providers wouldn't necessarily look at, screening for substance use and making sure that person is treated if it's a co-occurring issue, screening for medical issues and referring to primary care. This more integrated care is better quality care, and we have a number of indications that that is happening…And then just the care coordination and the referrals to and from partners in the community, what they're doing around addressing social drivers…This is quality care, when you're meeting the needs, all of the needs and providing a holistic approach to people that you're serving."*
>
> ~New Jersey state official

Findings on quality should be interpreted with caution because of the limitations associated with the analysis. The denominators for these measures were relatively small because not all beneficiaries or, for the follow-up measures, not all hospitalizations or ED visits, qualified for inclusion. For these reasons, the analyses provide a small window into changes in quality associated with the demonstration. We also assessed only quality measures that were measurable in claims data. The findings of mostly no differences between treatment and comparison groups might reflect other efforts in the states to improve the quality of care that similarly affected CCBHCs and comparison clinics, given that the findings generally indicated improvements over time for both groups. In future years of the evaluation, we will examine a broader set of quality measures reported by clinics and states. Past analyses of additional quality measures have shown improvements on some of these measures over time, but did not involve a matched comparison group (Wishon et al. 2023, Brown et al. 2021).

Although we did not find impacts on most measures in the analysis, officials in most states suggested the model has enhanced the quality of care demonstration CCBHCs provided relative to other behavioral health providers. State officials suggested several features of the demonstration and CCBHC model have the potential to improve care relative to other providers in their states. For example, several states credited the PPS as providing greater flexibility to provide the amount, type, and duration of services than

[48] We did not analyze impacts on follow-up measures in Oklahoma because the claims data used for this analysis would likely undercount the delivery of follow-up care provided by CCBHCs during the demonstration period under the PPS-2 model used by the state.

traditional payment arrangements for community behavioral health providers, allowing more tailored and higher-quality care. The quality bonus payments associated with the PPS add another lever for CCBHCs to use to improve quality. For example, officials in Michigan shared that CCBHCs meeting thresholds for receipt of demonstration quality bonus payments have been able to invest those payments in hiring staff or purchasing equipment to further improve quality. Officials in a few states also noted that stronger requirements for care coordination and community partnerships for CCBHCs could result in improved care relative to other behavioral health providers, including through better screening, monitoring, and improved pathways for obtaining health care and community supports.

C. Costs

The demonstration was associated with increased total Medicaid costs in Nevada and Oklahoma driven by increased costs for ambulatory care visits.[49] The demonstration was also associated with decreased inpatient costs for some subgroups in both states; these reductions did not offset the increase in ambulatory costs. The increased costs associated with the demonstration, however, and particularly the costs driven by increased costs for ambulatory behavioral health visits, might not be wholly unexpected. The demonstration did not have cost neutrality requirements, and most state officials did not anticipate immediate cost savings. Further, in a previous analysis of the demonstration's impacts on costs during the first two DYs in Oklahoma, we found the demonstration was associated with and significantly increased total costs for the treatment group relative to the comparison group (Brown et al. 2021).

Although officials in most states anticipated the demonstration could ultimately result in cost savings from improvements in quality and outcomes of care and reductions in acute care services, several also expected to see increases in costs, especially in the early years of the demonstration. For example, although Kentucky hopes the demonstration will eventually yield savings, officials acknowledged there will likely be an initial increase in costs associated with serving people who have not before been engaged in care. Moreover, Oklahoma and several other states noted that not entering the demonstration with the explicit expectation of savings, instead pursuing the model as an opportunity to expand and enhance care while more effectively funding a historically underfunded system.

> "I don't believe that anybody expected [the demonstration] to have cost savings [at the outset]. I believe that the leadership at the time expected it to cost more because our behavioral health providers have been underpaid for so many years."
>
> ~Missouri state official

Although states generally have not assessed the demonstration's costs in an ongoing way, Nevada officials reported examining Medicaid reimbursement for CCBHC services versus what would have been reimbursed for services had CCBHCs remained SUD providers early in the demonstration. Consistent with findings from our impact analyses, the state did not identify cost savings. Several other states shared that the model increased state Medicaid costs initially, noting increases were because of costs associated with funding ambulatory services through a new PPS, covering a more robust set of services, and serving more Medicaid-covered people than before the demonstration. As one official in New York put it, "Since the beginning, the main driver from the CCBHC [demonstration] is certainly the increased volume of paid

[49] We did not analyze impacts on costs in Minnesota.

Medicaid visits that the CCBHCs are generating. And when you're providing services to 25% of your population [that] hasn't been seen in service [before]… all of a sudden, that's a big introduction of cost to the Medicaid system. The other thing that I recall from…early analysis was it was not just increases in cost on the CCBHC side, but we were seeing also increases in some of the primary care costs associated with those individuals. And our thought…was, because they had not been seen by anyone in a couple years…they had a lot of other issues, primary care issues."

D. Future evaluation activities

In each year of the evaluation, we will submit an annual report synthesizing findings related to changes in demonstration implementation and answering additional evaluation questions related to the PAMA topics. In future evaluation reports, we will incorporate findings from additional interviews with state officials, clinic-level surveys, cost reports and quality measures submitted by states and CCBHCs, and interviews with leaders at CCBHCs. We also will present data from CCBHC client focus groups to better understand the experiences of people receiving care at CCBHCs.

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Appendix A.
Supplemental Medicaid data methods and impact findings

This appendix describes how we implemented the impact analyses using TAF data. We first describe how we selected states for the impact analyses (Section I). We then describe our approach to identifying beneficiaries who received care from CCBHCs (the treatment group) and other behavioral health clinics (the comparison group) (Section II). In Section III, we detail the exclusion criteria applied to the treatment and comparison group beneficiaries to identify the population included in propensity score matching. We go on to describe the measures constructed for matching and impact analyses (Section IV), our approach to propensity score matching and the results of that matching (section V), and our methods for the impact analyses and supplemental tables with impact results (section VI).

I. State selection for impact analyses

To prioritize states for the analysis, we first reviewed the TAF *Data Quality (DQ) Atlas*[50] for each of the eight original demonstration states. The *DQ Atlas* rates the completeness of the TAF enrollment and claims files for each state and the quality of specific data elements. Our review focused on the completeness of the TAF enrollment and claims files, the quality of data elements required for developing our analysis files (for example, diagnosis codes, procedure codes, and billing provider identifiers), and the completeness of the fee-for-service and managed care encounters payment data. We used *DQ Atlas* information from 2015 (if they were available, otherwise we began in 2016) through 2019, which were the most recent data available when we began this work. We looked at data quality *in each year* and *over time within each state* to identify states with data quality issues that would jeopardize (1) how accurately we could measure demographic characteristics and claims-based outcomes and covariates for treatment and comparison group beneficiaries or (2) our ability to identify CCBHCs and other behavioral health clinics in the claims data. Based on this analysis, we identified Minnesota, Nevada, and Oklahoma as most promising for the impact analysis.

II. Identification of treatment and comparison clinics

We relied on the TAF other services (OT) and annual provider (APR) files to identify demonstration CCBHCs and other behavioral health clinics from which to identify treatment and comparison beneficiaries, respectively, for the study population. We identified claims from CCBHCs in the TAF OT files by searching for claims with the CCBHC demonstration procedure codes (T1040 or T1041) in Nevada and Oklahoma, respectively, or a set of CCBHC procedure codes and modifiers in Minnesota.[51] We calculated the number of unique beneficiaries served by CCBHCs in each year of the TAF OT files 2017–2020, which we then compared with the counts of Medicaid-enrolled people served by CCBHCs reported in states' quality measure reports. This comparison helped confirm that we were accurately identifying claims from CCBHCs.

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[50] Available at https://www.medicaid.gov/dq-atlas/welcome.

[51] We used the CCBHC procedure codes and modifiers in Minnesota at the state's suggestion because its CCBHCs did not use the demonstration procedure codes.

We conducted a set of data processing steps to identify other non-CCBHC behavioral health clinics in each state. We first identified the taxonomy codes billed on the demonstration claims from CCBHCs (Exhibit A.II.1).

Appendix Exhibit A.II.1. Taxonomy codes billed by CCBHCs in Minnesota, Nevada, and Oklahoma, and that we used to identify other behavioral health clinics for the comparison group

Taxonomy code	Description	Minnesota	Nevada	Oklahoma
251S00000X	Non-individual - agencies - community/behavioral health	X	X	
261QM0801X	Non-individual - ambulatory health care facilities - clinic/center - mental health (including community mental health center)	X	X	X
261QM0855X	Non-individual - ambulatory health care facilities - clinic/center - adolescent and children mental health	X		
261QR0405X	Non-individual - ambulatory health care facilities - clinic/center - rehabilitation, substance use disorder	X[a]		

Source: Mathematica analyses of Minnesota, Nevada, and Oklahoma's 2017–2020 TAF OT files.

[a] Not all Minnesota CCBHCs billed to this code related to substance use disorder. We required potential comparison providers who billed to this code to also bill to at least one of the three other Minnesota taxonomy codes.

CCBHC = Certified Community Behavioral Health Clinic; OT = other services claims file; TAF = Transformed Medicaid Statistical Information System Analytic File.

Next, we used these taxonomy codes to identify non-CCBHC behavioral health clinics by searching the APR files for provider records that used any of these codes. Among those provider records, we retained only those with "facility" or "group" provider type codes and dropped those with a personal name in the provider legal name field to eliminate solo providers from the comparison group. We created lists of potential clinics for the comparison group for each year by grouping APR records that shared any of the following characteristics: state-specific identifier, National Provider Identifier (NPI), name, and/or address.

Finally, we looked for claims from the other behavioral health clinics in the OT file corresponding to the same year of the APR files by searching for the relevant state-specific provider identifiers or NPIs in the provider billing field.[52] Among clinics with claims, we further limited the set of clinics to those that billed to the relevant taxonomy codes in claims, and met a minimum threshold for the number of enrollees served per year to further ensure the comparison group did not include solo or small group therapy practices.[53] We also excluded clinics that obtained CCBHC certification via a SPA or 1115 waiver or received a CCBHC-E grant in the year before their certification date or grant award.

In Minnesota and Oklahoma, the number of Medicaid enrollees that treatment group clinics served was comparable with the numbers reported by Minnesota and Oklahoma with their CCBHC quality measures (Nevada did not report quality measures for the years included in this analysis). Exhibit A.II.2 presents the

[52] We also tried a sensitivity check searching in the servicing provider ID/NPI field but did not find any additional claims.

[53] The minimum size threshold equaled the minimum CCBHC size in any year in 2018-2020 (MN and OK) or 2019-2020 (NV, due to slower rollout of the demonstration) less 25 percent. The size threshold for number of enrollees served in a year was 445 in Minnesota, 295 in Nevada , and 1,184 in Oklahoma.

number of unique Medicaid and CHIP enrollees who had a claim from at least one of the demonstration CCBHCs or comparison clinics in each state in each year (2017 to 2020). We were initially concerned about the increased number of enrollees served in Nevada in 2019, but we confirmed these numbers were accurate with the state.

Appendix Exhibit A.II.2. Number of unique CCBHC and comparison enrollees served per year

		Number of Medicaid/CHIP enrollees with at least one claim from CCBHCs and comparison clinics in:			
State	**CCBHC/Comparison**	**2017**	**2018**	**2019**	**2020**
Minnesota	CCBHCs	8,781	12,207	11,982	10,836
	All potential comparison clinics, excluding 1115s/SPAs/CCBHC-Es[a]	26,732	39,794	51,007	35,999
Nevada	CCBHCs	427	1,110	2,062	2,087
	All potential comparison clinics, excluding 1115s/SPAs/ CCBHC-Es[a]	4,653	6,245	16,888	17,962
Oklahoma	CCBHCs	8,893	10,841	11,953	12,513
	All potential comparison clinics, excluding 1115s/SPAs/ CCBHC-Es[a]	19,358	26,584	25,694	20,491

Source: Mathematica analyses of Minnesota, Nevada, and Oklahoma's 2017-2020 TAF APR and OT files.

Notes: The numbers in the table reflect the number of unique enrollees who had at least one claim from a CCBHC or comparison clinic *in each year*. Some enrollees, however, will have had claims in multiple years.

[a] We excluded clinics that states certified as CCBHCs under an 1115 waiver or SPA or received a CCBHC-E grant starting in the year before their certification date/grant award. For example, a comparison clinic that received a CCBHC-E grant any time in 2020 is included in the comparison pool in 2017 and 2018 only.

1115/SPA = 1115 waiver or state plan amendment; APR = annual provider file; CCBHC = Certified Community Behavioral Health Clinic; CCBHC-E = Certified Community Behavioral Health Clinic Expansion grantee; CHIP = Children's Health Insurance Program; OT = other services claims file; TAF = Transformed Medicaid Statistical Information System Analytic File.

III. Identification of the study population

To create the study population, we identified all beneficiaries ever served by CCBHCs and the other clinics in the comparison group between the start of the demonstration in each state and December 31, 2020, the most recent TAF data available at the time of our analysis. We set the baseline and demonstration periods for each beneficiary relative to their individual demonstration enrollment date—that is, the date that a beneficiary first visited a CCBHC or comparison clinic during the demonstration period.[54] We then followed a stepwise procedure to exclude beneficiaries from the final analytic sample for the following reasons:

1. Enrollment-related factors that would prevent the accurate measurement of service use or presence of behavioral and physical health conditions. We excluded beneficiaries who:

[54] We have since obtained 2021 TAF data. Thus, we have demonstration period outcomes for all beneficiaries for a minimum of one year after their demonstration enrollment date.

a. Were dually eligible for Medicaid and Medicare on their demonstration enrollment date (because we did not link Medicaid and Medicare claims and could therefore not accurately report all services for the dually enrolled population),

b. Were not eligible for Medicaid on their demonstration enrollment date,

c. Had restricted benefits on their demonstration enrollment date, or

d. Had less than six months of claims or encounter data in the baseline period (we excluded these beneficiaries because we might not have an accurate picture of their health care use and relevant diagnoses in the baseline period for matching)

2. Other data-related exclusions. We excluded beneficiaries who:

e. Did not have evidence of a behavioral health condition in the TAF either during the baseline period or within the first month of their demonstration enrollment date (we excluded these beneficiaries because we matched on behavioral health conditions),

f. Had a date of death in the TAF that indicated the beneficiary died before their demonstration enrollment date,

g. Had evidence of other insurance coverage in the TAF on their demonstration enrollment date (we excluded these beneficiaries because we might not observe all health care use and relevant diagnoses), or

h. Had missing or inaccurate address data (we excluded these beneficiaries because we matched on county-related characteristics; these include a four-category variable reflecting urbanicity and the Centers for Disease Control and Prevention's Social Vulnerability Index summary score) and covariates for time-varying COVID-19-related county-level characteristics in our regression models.

3. Matching-specific data issues. We excluded beneficiaries who:

i. Had extremely high rates of hospitalizations or were in a major eligibility category that was not present among beneficiaries in the other group, or

j. Had missing data in the quarter before their demonstration enrollment date (some beneficiaries who met all the criteria above nonetheless were not observable in Medicaid in the quarter prior to their demonstration enrollment date. We excluded these beneficiaries because we included measures of health care use in the quarter prior to their enrollment date in matching).

Exhibit A.III.1 shows the number and percent of beneficiaries excluded at each step.

Appendix Exhibit A.III.1. Identification of the study population in Minnesota, Nevada, and Oklahoma

	Minnesota		Nevada		Oklahoma	
	Number of enrollees	Percent of remaining population dropped	Number of enrollees	Percent of remaining population dropped	Number of enrollees	Percent of remaining population dropped
All enrollees served by a CCBHC or comparison clinic between their	107,205	n.a.	36,440	n.a.	77,586	n.a.

	Minnesota		Nevada		Oklahoma	
	Number of enrollees	Percent of remaining population dropped	Number of enrollees	Percent of remaining population dropped	Number of enrollees	Percent of remaining population dropped
demonstration enrollment date and December 31, 2020						
Enrollment-related exclusion criteria						
Dually eligible for Medicare and Medicaid[a]	13,881	13%	3,562	10%	9,362	12%
Not eligible for Medicaid or CHIP[a]	1,948	2%	<11	<1%	2,820	4%
Had restricted benefits[a]	<100[b]	<1%	414	1%	23	0%
Had less than 6 months of Medicaid data in the baseline period	20,952	23%	7,852	24%	20,004	31%
Data-related exclusion criteria						
Did not have a behavioral health diagnosis in the baseline period or within a month after the demonstration enrollment date[c]	3,087	4%	720	3%	3,919	9%
Death date variable indicated the enrollee died before their demonstration enrollment date	0	0%	<11	<1%	<11	<1%
Had other insurance coverage[a]	700	1%	192	1%	883	2%
Had missing or inaccurate county data	298	0%	2,045	9%	790	2%
Propensity score-related exclusion criteria						
Lack of overlap between treatment and comparison group in select measures[d]	0	0%	153	1%	<11	<1%
Missing data in the last baseline quarter[e]	<11	<1%	12	0%	<11	<1%
Final study population	66,233	n.a.	21,480	n.a.	39,773	n.a.

Source: Mathematica analyses of TAF eligibility and claims data.

[a] We measured these characteristics on each beneficiary's demonstration enrollment date—that is, the date they had their first visit to a CCBHC or comparison clinic during the demonstration period.

[b] CMS rules require us to mask cells with fewer than 11 beneficiaries. In addition, we must mask additional cells in cases when a masked cell could be calculated. For this latter reason, we masked the count in this cell because the only other cell with fewer than 11 beneficiaries in this state would otherwise be calculable.

[c] We searched TAF claims and encounter records for evidence of behavioral health conditions over the 18 months before the demonstration enrollment date in Minnesota and 24 months before the enrollment date in Oklahoma and Nevada. In Minnesota, beneficiaries whose demonstration enrollment date occurred on the first day of the CCBHC demonstration in the state (July 1, 2017) had only had 18 months of available data (Minnesota TAF were available starting in 2016 only). In Oklahoma and Nevada, beneficiaries whose demonstration enrollment date occurred on the first day of the CCBHC demonstration in the states (April 1, 2017, and July 1, 2017, respectively) had at least 24 months of TAF data available, because these states had TAF data available starting in 2015.

[d] In Oklahoma, we excluded a small number of treatment group beneficiaries from the analysis population because they had more hospitalizations than the maximum number found among comparison pool beneficiaries. In Nevada, we excluded n=153 beneficiaries from the comparison pool because their main eligibility group category indicated "aged" or "pregnant" and no treatment group beneficiaries were in those eligibility categories.

[e] We matched beneficiaries based on demographic characteristics; Medicaid-related characteristics; presence of behavioral and physical health conditions; and number of hospitalizations, ED visits, and ambulatory care visits in the baseline year. In addition, we matched on number of hospitalizations, ED visits, and ambulatory care visits in the quarter before the initial visit because we saw in quarterly trend plots that health care use increased in the quarter before beneficiaries' enrollment dates. Although we required beneficiaries to have at least 6 months of Medicaid data in the baseline period, we found that a few beneficiaries had no data in the quarter before the demonstration enrolment date; these beneficiaries all had data in the quarters prior to the last quarter and in the first quarter of their demonstration period, suggesting that their missing data was due to churn. Because they had missing data in the last quarter, we dropped them from the population included in matching.

CCBHC = Certified Community Behavioral Health Clinic; CHIP = Children's Health Insurance Program; CMS = Centers for Medicare & Medicaid Services; ED = emergency department; n.a. = not applicable; SVI = Social Vulnerability Index; TAF = T-MSIS Analytic Files.

IV. Measures

A. Claims-based service use measures

The service use measures included total number of inpatient stays, outpatient emergency department (ED) visits, and ambulatory visits. For each outcome, we calculated total number of all-cause stays or visits as well as total number of behavioral health-related and physical health-related stays or visits. We categorized measures of service use as behavioral health-related using the diagnosis codes on the underlying claims or encounters. Any claim or encounter without a BH diagnosis in any field (primary or otherwise) was categorized as physical health related.

ED visits. We calculated outpatient ED visits by deduplicating outpatient ED claims and encounters by service date, such that a beneficiary could only have one outpatient ED visit per day. We calculated ED visits per 1,000 beneficiaries per year and measured any ED use with a binary indicator for the relevant measurement period.

Inpatient stays. For inpatient stays, we combined initial claims and all interim claims representing the same stay into one stay. We defined an interim claim for a beneficiary's stay if it had (1) the same admission date as the initial claim, (2) an admission date that was equal to the discharge date from the initial claim, or (3) an admission date that occurred between the admission date and the discharge date of the initial claim or another interim claim. In addition, ED visits that resulted in an inpatient stay were included in the inpatient stay (and not counted toward the number of outpatient ED visits); this was done by identifying any ED visit claims or encounters with a service date on or between the admission and discharge dates of an inpatient claim for the same beneficiary. We calculated inpatient stays per 1,000 beneficiaries per year and measured the any inpatient use with a binary indicator for the relevant measurement period.

Ambulatory care. We measured ambulatory care visits using the TAF federally assigned service category (FASC) variable. Specifically, we identified ambulatory visit claims if they were from a CCBHC or comparison clinic or had a FASC code indicating the claim was from an outpatient facility (for example, an outpatient hospital), a clinic (for example, federally qualified health centers and rural health centers), or if the FASC code indicated a claim was from physician or other professional and the place of service code on the claim indicated the visit occurred in a noninstitutional setting. Our measure of ambulatory care excluded claims and encounters for ED visits at outpatient hospitals (these were included in the ED visit measure). For ambulatory visits, we deduplicated claims and encounters by service date and National Provider Identifier, such that a beneficiary could only have one ambulatory care visit to any single provider

(based on the National Provider Identifier) per day (beneficiaries can have multiple visits to different providers on the same day).

B. Claims-based cost measures

We calculated Medicaid cost measures for Oklahoma and Nevada. This measure set included total costs and costs for behavioral health- and physical health-related services as well as costs for inpatient stays, ED visits, and ambulatory visits (overall and for behavioral health- and physical health-related care). Oklahoma primarily reimbursed providers through fee-for-service during our study period, enabling us to construct and include cost measures in the impact analysis. For Nevada, we used both fee-for-service claims and managed care encounter records to calculate costs because nearly 40 percent of the analysis population were enrolled in managed care plans. However, initial checks indicated that the cost data on the encounter records was not reliable before 2017. For this reason, we limited our cost analyses in Nevada to beneficiaries with a demonstration enrollment date on or after January 1, 2018, to ensure a full year of cost data in the baseline period. All cost measures were specified as costs per beneficiary per month.

C. Quality measures

We calculated eight of the required or optional CCBHC quality measures using TAF claims and encounter data using the 2021 Medicaid Adult and Child Core Set technical specifications, including the following: [55]

- Follow-Up After Hospitalization for Mental Illness: Ages 18+ (FUH-AD)
- Follow-Up After Hospitalization for Mental Illness: Ages 6 to 17 (FUH-CH)
- Follow-Up After Emergency Department Visit for Mental Illness: Ages 18+ (FUM-AD)
- Follow-Up After Emergency Department Visit for Mental Illness: Ages 6 to 17 (FUM-CH)
- Follow-Up After ED Visit for Alcohol and Other Drug Abuse or Dependence: Ages 18+ (FUA-AD)
- Follow-Up After ED Visit for Alcohol and Other Drug Abuse or Dependence: Ages 13 to 17 (FUA-CH)
- Adherence to Antipsychotic Medications for Individuals with Schizophrenia (SAA-AD)
- Antidepressant Medication Management (AMM-AD)

We did not calculate the follow-up measures (FUH-AD, FUH-CH, FUM-AD, FUM-CH, FUA-AD, FUA-CH) for Oklahoma because the state uses the PPS-2 model to reimburse CCBHCs. In Oklahoma, daily visits could be undercounted in claims data if CCBHCs only submit one claim per client per month. For example, if the CCBHCs only submitted one claim per beneficiary per month, and a beneficiary had a CCBHC visit on January 6, 2018, and a qualifying ED visit on January 10, 2018, we might not observe claims for follow-up visits that occurred after the ED visit between January 11, 2018, and January 30, 2018.

[55] Technical specifications for the Medicaid child and adult health care quality measures are available at https://www.medicaid.gov/medicaid/quality-of-care/performance-measurement/adult-and-child-health-care-quality-measures/index.html. We used 2021 Medicaid Core Set technical specifications because 2021 was the most recent year of TAF data included in our analyses, and the CCBHC quality measures technical specifications available when we constructed these measures were from 2016.

Measure specifications and deviations

We replicated the Medicaid Core Set technical specifications as closely as possible, with a few deviations specific to the TAF data and because we defined years in our analysis population relative to each beneficiary's demonstration enrollment date. We made the following deviations for *all* quality measures:

- We calculated the measures for years based on each beneficiary's demonstration enrollment date instead of calendar years.
- To remain internally consistent with the measures of inpatient stays and ED visits we described above, we used our evaluation's definitions for these events instead of the HEDIS code sets used by the Core Set measures. (In ad-hoc analyses, we confirmed that the measurement of an inpatient stay was nearly identical between our definition and the Core Set definition.)
- We did not measure hospice use in the TAF, so we did not apply the hospice exclusion in the Core Set technical specifications. We expected hospice users to be an extremely small segment of the study population, if they were included at all.
- We updated the definition of outpatient visits to include visits to CCBHCs (that is, claims with relevant CCBHC demonstration codes) and comparison clinics. (We expect visits to comparison clinics were likely already captured by the Core Set definition of outpatient visits.)
- We did not include denied claims in these calculations as they were not included in the TAF data.

We also made a few deviations for specific measures:

- **AMM-AD.** We were unable to calculate the measure annually; the measure's long window to identify beneficiaries eligible for inclusion required lookback into the prior year and a lookforward that potentially extended into the next year, making it impossible to report annually. For this reason, we calculated the measure once for the demonstration enrollment period, with the intake period set as the first year starting on the demonstration enrollment date for each beneficiary who qualified for the measure.
- **SAA-AD.** We deviated from the Medicaid Core Set technical specifications as follows:
    - We excluded enrollees ages 65 or older from the denominator. Because we excluded beneficiaries dually eligible for Medicare and Medicaid, few beneficiaries in our analysis population were age 65 or older.
    - We required continuous enrollment during the measurement year starting from the month of the index prescription to the end of measurement year. The Core Set technical specifications require continuous enrollment during the entire measurement year. To ensure adequate denominator counts, we relaxed the continuous enrollment requirement slightly because relatively few beneficiaries had schizophrenia and qualified for this measure.
- **Follow-up after hospitalization measures** (FUH-AD, FUH-CH). The Core Set specifications indicate that users should develop their own approach to identifying claims from mental health providers. We identified mental health claims based on the same set of HEDIS value set diagnosis codes used to identify inpatient stays for the measure denominator.

Finally, in Minnesota and Nevada, for which we were able to construct and analyze all six follow-up measures, we combined the adult and child populations for the same measure into the same analysis (for example, the analyses of follow-up after hospitalization for mental illness included all qualifying hospitalizations for adults age 18 and older and children ages 6 to 17) to ensure an adequate number of denominator events in the analyses.

D. Variables for propensity score matching or for post-matching balance, other data checks, and regression adjustment

In addition to the service use, cost, and quality measures, we created several other measures to use in propensity score matching, to check balance between the final treatment and comparison groups, or as regression covariates for impact analyses. Exhibit A.IV.1 lists these variables and their specifications.

Appendix Exhibit A.IV.1. Variables for propensity score matching models or for post-matching balance, other data checks, and regression adjustment

Variable	Description	Type	Use
Demographic and eligibility characteristics			
Demonstration enrollment date	Variable indicating the date a beneficiary started receiving service at either a CCBHC or a comparison facility during the demonstration period.	Date	Propensity score matching
Age	Variable indicating age at demonstration enrollment, calculated from beneficiary date of birth.	Continuous and categorical	Propensity score matching and regression adjustment (categorical) and balance checks (continuous and categorical)
Male	Variable indicating beneficiary's sex.	Binary	Propensity score matching and regression adjustment
Race and ethnicity	Variable indicating beneficiary's race. Categories include non-Hispanic White, non-Hispanic Black, Hispanic, and all other races and ethnicities.	Categorical	Propensity score matching and regression adjustment
Eligibility	Variable indicating the main Medicaid eligibility a beneficiary had at demonstration enrollment. Categories include pregnant, child, adult nondisabled, adult disabled, and adult expansion.	Categorical	Propensity score matching and regression adjustment
Managed care	Variable indicating enrollment in a comprehensive managed care plan at demonstration enrollment (Minnesota and Nevada only).	Binary	Propensity score matching and regression adjustment
Primary care case management	Variable indicating enrollment in a primary care case management program at demonstration enrollment (Oklahoma only).	Binary	Propensity score matching and regression adjustment

Variable	Description	Type	Use
Home- and community-based service (HCBS) use	Variable indicating whether the beneficiary was in a HCBS program at demonstration enrollment. This includes enrollment in a 1915(c), 1915(i), 1915(j), or 1915(k) program, as relevant in each state.	Binary	Propensity score matching and regression adjustment
Baseline months with full benefits	Variable capturing the number of months a beneficiary was enrolled in Medicaid with full benefits during the baseline period.	Continuous	Propensity score matching and regression adjustment
Receipt of CCBHC and comparison facility services in the demonstration period	Variable indicating whether a beneficiary received services at both a CCBHC and a comparison facility during the first enrollment year.	Binary	Other data checks
Behavioral and physical health conditions			
Anxiety disorders	Variable indicating whether a beneficiary had an anxiety disorder in the baseline period or within the first month of demonstration enrollment.[b]	Binary	Propensity score matching and regression adjustment
Bipolar disorder	Variable indicating whether a beneficiary had bipolar disorder in the baseline period or within the first month of demonstration enrollment.[b]	Binary	Propensity score matching and regression adjustment
Depressive disorders	Variable indicating whether a beneficiary had a depressive disorder in the baseline period or within the first month of demonstration enrollment.[b]	Binary	Propensity score matching and regression adjustment
Schizophrenia and other psychotic disorders	Variable indicating whether a beneficiary had schizophrenia or other psychotic disorder in the baseline period or within the first month of demonstration enrollment.[b]	Binary	Propensity score matching and regression adjustment
Personality disorders	Variable indicating whether a beneficiary had a personality disorder in the baseline period or within the first month of demonstration enrollment.[b]	Binary	Propensity score matching and regression adjustment
ADHD, conduct disorders, and hyperkinetic syndrome	Variable indicating whether a beneficiary had ADHD, conduct disorder, or hyperkinetic syndrome in the baseline period or within the first month of demonstration enrollment.[b]	Binary	Propensity score matching and regression adjustment
Post-traumatic stress disorder	Variable indicating whether a beneficiary had a post-traumatic stress disorder in the baseline period or within the first month of demonstration enrollment.[b]	Binary	Propensity score matching and regression adjustment
Other mental health diagnoses	Variable indicating whether a beneficiary had a mental health condition in the baseline period or within the first month of demonstration enrollment not categorized in any of the other mental health categories above.[b,c]	Binary	Propensity score matching and regression adjustment

Variable	Description	Type	Use
Alcohol use disorders	Variable indicating whether a beneficiary had an alcohol use disorder in the baseline period or within the first month of demonstration enrollment.[b]	Binary	Propensity score matching and regression adjustment
Drug use disorders	Variable indicating whether a beneficiary had a drug use disorder in the baseline period or within the first month of demonstration enrollment.[b]	Binary	Propensity score matching and regression adjustment
Opioid use disorders	Variable indicating whether a beneficiary had an opioid use disorder in the baseline period or within the first month of demonstration enrollment.[b]	Binary	Propensity score matching and regression adjustment
Asthma	Variable indicating whether a beneficiary had asthma in the baseline period.	Binary	Propensity score matching and regression adjustment
Diabetes	Variable indicating whether a beneficiary had diabetes in the baseline period.	Binary	Propensity score matching and regression adjustment
COPD	Variable indicating whether a beneficiary had COPD in the baseline period.	Binary	Propensity score matching and regression adjustment
Heart disease	Variable indicating whether a beneficiary had ischemic heart disease, acute myocardial infarction, or heart failure in the baseline period.	Binary	Propensity score matching and regression adjustment
Hypertension	Variable indicating whether a beneficiary had hypertension in the baseline period.	Binary	Propensity score matching and regression adjustment
Hyperlipidemia	Variable indicating whether a beneficiary had hyperlipidemia in the baseline period.	Binary	Propensity score matching and regression adjustment
Obesity	Variable indicating whether a beneficiary was obese in the baseline period.	Binary	Propensity score matching and regression adjustment
Any mental health condition	Variable indicating the presence of one or more of the following conditions in the baseline period or within the first month of demonstration enrollment[b]: anxiety disorders, bipolar disorder, depressive disorders, schizophrenia and other psychotic disorders, personality disorders, ADHD, conduct disorders, hyperkinetic syndrome, post-traumatic stress disorder, and other mental health conditions.	Binary	Propensity score matching and regression adjustment

Variable	Description	Type	Use
Any substance use disorder	Variable indicating the presence of one or more of the following disorders during the baseline period or within the first month of demonstration enrollment[b]: alcohol use disorder, drug use disorders, opioid use disorders.	Binary	Propensity score matching and regression adjustment
Any behavioral health conditions	Variable indicating the presence of one or more mental health conditions or substance use disorders during the baseline period or within the first month of demonstration enrollment.[b]	Binary	Balance check
Any physical health conditions	Variable indicating the presence of one or more of the following conditions during the baseline period: asthma, COPD, diabetes, heart disease, hypertension, hyperlipidemia, obesity.	Binary	Propensity score matching and regression adjustment
Number of mental health conditions	Count of the number of mental health conditions during the baseline period or within the first month of enrollment.[b]	Continuous	Balance check and regression adjustment
Number of substance use disorder conditions	Count of the number of substance use disorder conditions during the baseline period or within the first month of enrollment.[b]	Continuous	Balance check and regression adjustment
Number of physical health conditions	Count of the number of physical health conditions during the baseline period.	Continuous	Balance check and regression adjustment
Service use variables in the baseline year			
All-cause inpatient stays per 1,000 beneficiaries	Variable capturing the number of all-cause inpatient stays, per 1,000 beneficiaries per year, during the baseline period.	Binary	Propensity score matching
BH-related inpatient stays per 1,000 beneficiaries	Variable capturing the number of BH-related inpatient stays, per 1,000 beneficiaries per year, during the baseline period.	Binary	Propensity score matching
PH-related inpatient stays per 1,000 beneficiaries	Variable capturing the number of PH-related inpatient stays, per 1,000 beneficiaries per year, during the baseline period.	Binary	Propensity score matching
All-cause ED visits per 1,000 beneficiaries	Variable capturing the number of all-cause ED visits, per 1,000 beneficiaries per year, during the baseline period.	Binary	Propensity score matching
BH-related ED visits per 1,000 beneficiaries	Variable capturing the number of BH-related ED visits, per 1,000 beneficiaries per year, during the baseline period.	Binary	Propensity score matching
PH-related ED visits per 1,000 beneficiaries	Variable capturing the number of PH-related ED visits, per 1,000 beneficiaries per year, during the baseline period.	Binary	Propensity score matching
All-cause ambulatory visits per 1,000 beneficiaries	Variable capturing the number of all-cause ambulatory visits, per 1,000 beneficiaries per year, during the baseline period.	Binary	Propensity score matching
BH-related ambulatory visits per 1,000 beneficiaries	Variable capturing the number of BH-related ambulatory visits, per 1,000 beneficiaries per year, during the baseline period.	Binary	Propensity score matching

Variable	Description	Type	Use
PH-related ambulatory visits per 1,000 beneficiaries	Variable capturing the number of PH-related ambulatory visits, per 1,000 beneficiaries per year, during the baseline period.	Binary	Propensity score matching
Service use variables in the quarter before the enrollment date[d]			
All-cause inpatient stays per 1,000 beneficiaries	Variable capturing the number of all-cause inpatient stays, per 1,000 beneficiaries, in the quarter prior to enrollment.	Continuous	Propensity score matching
BH-related inpatient stays per 1,000 beneficiaries	Variable capturing the number of BH-related inpatient stays, per 1,000 beneficiaries, in the quarter prior to enrollment.	Continuous	Propensity score matching
All-cause ED visits per 1,000 beneficiaries	Variable capturing the number of all-cause ED visits, per 1,000 beneficiaries, in the quarter prior to enrollment.	Continuous	Propensity score matching
BH-related ED visits per 1,000 beneficiaries	Variable capturing the number of BH-related ED visits, per 1,000 beneficiaries, in the quarter prior to enrollment.	Continuous	Propensity score matching
All-cause ambulatory visits per 1,000 beneficiaries	Variable capturing the number of all-cause ambulatory visits, per 1,000 beneficiaries, in the quarter prior to enrollment.	Continuous	Propensity score matching
BH-related ambulatory visits per 1,000 beneficiaries	Variable capturing the number of BH-related ambulatory visits, per 1,000 beneficiaries, in the quarter prior to enrollment.	Continuous	Propensity score matching
Any all-cause inpatient stay	Variable indicating whether the beneficiary had an all-cause inpatient stay in the quarter prior to enrollment.	Binary	Propensity score matching
Regional and COVID-19-related variables			
Urbanicity	Variable capturing the level of urbanicity in the beneficiary's zip code of residence. Categories include large metro; small metro; non-metro, urban; non-metro, rural.	Categorical	Propensity score matching and regression adjustment
Social Vulnerability Index (SVI)	Variable capturing the vulnerability of communities (defined at the county level) to threats to public health. The SVI, developed by the Centers for Disease Control and Prevention, is based on 16 different measures of vulnerability across four themes: (1) socioeconomic status (for example, poverty, unemployment); (2) household composition and disability (for example, percentage of older adults and percentage disabled); (3) racial and ethnic minority status and language; and (4) housing type and transportation (for example, percentage of mobile homes, households with no vehicle).	Continuous	Propensity score matching and regression adjustment

Variable	Description	Type	Use
Pandemic Vulnerability Index (PVI)	Variable capturing how vulnerable a community (defined at the county level) is to the COVID-19 pandemic. The PVI, developed by researchers from the National Institute of Environmental Health Sciences, North Carolina State University, and Texas A&M University, combines 12 indicators across four major domains: current infection rates (infection prevalence, rate of increase); baseline population concentration (daytime density/traffic, residential density); current interventions (social distancing, testing rates); and health and environmental vulnerabilities (susceptible populations, air pollution, age distribution, comorbidities, health disparities, and hospital beds).	Continuous	Regression adjustment
County-level confirmed and probable COVID-19 deaths	A variable that captures the severity of COVID-19 in a region by counting the number of confirmed and probable COVID-19 deaths.	Continuous	Regression adjustment

[a] There was little overlap between treatment and comparison groups during the baseline period—specifically, only 3 percent (Oklahoma) and 5 percent (Minnesota and Nevada) of treatment group beneficiaries had a visit to a comparison clinic within the first year of enrollment. Likewise, in all three states, only 1 to 2 percent of comparison pool beneficiaries had a visit to a CCBHC within the first year of enrollment.

[b] We identified beneficiaries with any of the mental health or substance use disorder conditions in the baseline period as well as whether the beneficiaries had these diagnoses on their enrollment date or the within the first month of enrollment. We looked at claims on their enrollment date and first month post-enrollment because some beneficiaries might be newly seeking care for a mental health or substance use disorder condition not identified in their baseline claims data. We aimed to facilitate matching by identifying behavioral health conditions that beneficiaries are seeking care for on or in the first month of enrollment.

[c] Other mental health diagnoses include, for example, those related to intentional self-harm, eating disorders, postpartum depression and puerperal psychosis, adjustment disorders, dissociative and conversion disorders, somatization disorders, hypochondrial disorders, pain disorders related to psychological factors, gender identity disorders, and unspecific mental disorders.

[d] We found that ambulatory visits, ED visits, and inpatient stays increased in the quarter prior to enrollment relative to the three prior baseline quarters for both treatment and comparison groups across all three states, suggesting that many beneficiaries were experiencing health issues prior to seeking care. For this reason, we decided to match on use in the quarter prior to the enrollment date to improve the comparability of the two groups.

ADHD = attention-deficit/hyperactivity disorder; BH = behavioral health; CCBHC = Certified Community Behavioral Health Clinic; COPD = chronic obstructive pulmonary disorder; ED = emergency department; PH = physical health.

V. Propensity score matching methods

A. Propensity score matching

We used propensity score matching to construct matched comparison groups for the impact analyses. For each state, we first fit logistic regression models of baseline beneficiary characteristics (as listed in Appendix Exhibit A.IV.1) to estimate the probability (or propensity score) that a beneficiary was in the treatment group. Next, we used an optimal matching algorithm to form matched sets of treatment and comparison beneficiaries. Optimal matching selects matches to minimize the sum of the differences in propensity scores between the treatment beneficiaries and their matched comparisons across the entire sample. We allowed treatment beneficiaries to match to between one and three comparisons in all three states (that is, variable-ratio matching). We also allowed a single comparison to be matched to up to two treatment beneficiaries in Minnesota, up to seven treatment beneficiaries in Nevada, and up to three treatment beneficiaries in Oklahoma (matching with replacement). We matched with replacement in each state because we restricted possible matches to only those where a treatment beneficiary and potential comparison shared the following characteristics (that is, exact match criteria): either under age 19 (children) or ages 19 to 34, 35 to 49, and 50 and older (adults), and either have a substance use disorder (SUD) diagnosis or not. These criteria were used to facilitate subgroup analyses of children versus adults and beneficiaries with SUD versus non-SUD conditions in impact analyses. In addition, in Oklahoma and Minnesota, we exact matched on whether beneficiaries had at least one inpatient hospitalization in the quarter before their demonstration enrollment date; in Nevada, we exact matched on whether the beneficiary had any mental health condition or not as well as whether they had a demonstration enrollment date on or after January 1, 2018. These additional exact match criteria helped us identify matched sets with similar characteristics and with trends in key outcomes that were parallel between the two groups. The Nevada stratum defined by having a demonstration enrollment date on or after January 1, 2018, was implemented to facilitate cost analyses among that subgroup. Finally, we also required that the matched sets' individual demonstration enrollment dates fall within 60 days of each other to ensure similar availability of TAF data for each matched set and similar seasonal influences on health status and health care use.

After we identified the matched sets, we calculated the matching weights. All treatment beneficiaries received a weight of 1, whereas comparison beneficiaries received a weight equal to $\frac{{n_j}^T}{{n_j}^C}$, where ${n_j}^T$ and ${n_j}^C$ are the number of treatment and comparison beneficiaries in matched set j, respectively. For example, if in a matched set there were three comparisons matched to one treatment, then the comparisons in that matched set would each receive a weight of one-third.

B. Assessing the quality of the matched samples

We assessed the distribution of matching variables and baseline outcomes between the treatment and matched comparison groups. Generally, we considered the groups to exhibit good covariate balance and the match was typically considered acceptable when the samples met the following diagnostic criteria:

- **Standardized differences in means.** The standardized difference is the treatment–comparison group differences in the mean values of a covariate, expressed in standard deviation units. Smaller

standardized differences indicate more closely matched groups. Standardized differences of less than 0.25 typically indicate good balance (Rubin 2001). We sought standardized differences less than 0.15.

- **Percentage difference in means.** Even when the standardized difference is less than 0.15, the percentage difference in means can be quite large, especially for variables with a high variance (such as the baseline number of hospitalizations). For example, for a standardized difference of 0.10 for a variable with a coefficient of variation of 2.0, the absolute difference in means would be 20 percent of the mean. A difference this large in baseline means would cause concerns about the assumption that the study drew treatment and comparison groups from the same population and would have similar outcome trajectories in the absence of the demonstration. Therefore, we also examined the absolute difference in means and modified the matching approach (where appropriate) to keep the percentage difference in means on key characteristics below 10 percent whenever possible.
- **Equivalence tests.** An equivalence test expresses the null hypothesis that the absolute value of the difference between two means is greater than a specified amount. For these tests, we specified a difference in covariate means of at least 0.25 standard deviations. Rejecting the null hypothesis, implying that the difference in means is less than 0.25 standard deviations suggests an adequate match (Harder, Stuart, and Anthony, 2010).
- **A t-test for difference in means.** We also conducted a standard *t*-test for differences in the mean value of each covariate. The *t*-test is not typically recommended as a test for the quality of a match, because large samples will often lead to rejection of the null hypothesis. For some variables, the differences are statistically significant but not meaningful. When samples are small, the test can fail to reject the hypothesis of equal means for the two groups even when the differences are large because the power of the test is low. We included this test because it could signal issues with the match for further investigation.

C. Propensity score results

Prior to propensity score matching, there were some differences between the treatment and comparison groups in each state.

- In Minnesota, the treatment group was older than the comparison group (mean age of 28 versus 25) and had a higher percentage of beneficiaries with a SUD (32 versus 23 percent) in the baseline period. In addition, the treatment group had higher baseline rates of all-cause inpatient hospitalizations and all-cause emergency department (ED) visits and fewer ambulatory visits relative to the comparison group.
- In Nevada, the treatment group included people who were younger (mean age of 30 versus 35), were less likely to qualify for Medicaid based on disability status (6 versus 20 percent), had fewer non-Hispanic Black beneficiaries (13 versus 23 percent), and were more likely to reside in suburban (45 versus 12 percent) than large urban areas (42 versus 72 percent). A smaller percentage of treatment group beneficiaries in Nevada had at least one of the physical health conditions we examined (25 versus 39 percent) or a mental health condition (78 versus 93 percent). However, a larger share of the treatment group had a SUD (58 versus 41 percent). There were also differences between the Nevada treatment and comparison pool in baseline rates of inpatient hospitalizations, ED visits, and ambulatory visits, with higher rates among the comparison pool. The pre-matching differences in Nevada are likely

attributable to the geographic differences noted above—that is, a much larger share of the Nevada comparison group resided in Las Vegas.

- In Oklahoma, the treatment group was older (mean age of 21 versus 17), had a higher percentage of non-Hispanic White beneficiaries (53 versus 47 percent) and a lower percentage of Hispanic beneficiaries (10 versus 17 percent), included beneficiaries who were more likely to reside in suburban (48 versus 26 percent) than metro areas (a combined 51 versus 72 percent for large and small metro areas), and had higher rates of SUDs (17 versus 8 percent). The treatment group also had higher mean rates of inpatient hospitalizations, ED visits, and per beneficiary per month costs, though they had fewer ambulatory visits.

Propensity score matching generally resolved differences and resulted in groups that were well-balanced in their demographic and diagnostic characteristics and baseline service use trends. After propensity score adjustment, all matching variables were within 0.15 standardized differences, with most within 0.1 standardized differences, and trends in baseline outcomes were parallel between treatment and comparison groups. In Minnesota, the post-matching treatment and comparison groups included 14,165 and 28,047 beneficiaries, respectively (Exhibit A.V.1). In Nevada, the post-matching treatment and comparison groups included 2,263 and 4,097 beneficiaries, respectively (Appendix Exhibit A.V.2). In Oklahoma, the post-matching treatment and comparison groups included 11,453 and 15,218 beneficiaries, respectively (Appendix Exhibit A.V.3).

Appendix Exhibit A.V.1. Baseline characteristics of treatment group and matched comparison group beneficiaries for Minnesota

	Treatment group mean (SD)	Weighted comparison group mean (SD)	Adjusted difference	Percentage difference	Standardized difference	*t*-test *p*-value	Equivalence *p*-value
Demographic and eligibility characteristics at enrollment, percentages unless otherwise noted							
Age, mean	28 (16)	28 (16)	0.14	0.49	0.01	0.47	<0.01
Age category							
18 and under	37 (48)	37 (48)	0.00	0.00	0.00	1.00	<0.01
19 to 34	28 (45)	28 (45)	0.00	0.01	0.00	1.00	<0.01
35 to 49	22 (41)	22 (41)	0.00	0.00	0.00	1.00	<0.01
50 and older	14 (34)	14 (34)	0.00	0.00	0.00	1.00	<0.01
Male	49 (50)	49 (50)	-0.05	-0.10	0.00	0.94	<0.01
Race and ethnicity							
Non-Hispanic White	60 (49)	62 (49)	-1.44	-2.40	-0.03	0.02	<0.01
Non-Hispanic Black	19 (39)	18 (39)	0.63	3.34	0.02	0.17	<0.01
Hispanic	6.1 (23.9)	6 (23.7)	0.09	1.43	0.00	0.75	<0.01
Other races and ethnicities	13 (33)	12 (32)	0.78	6.14	0.02	0.04	<0.01
Unknown race and ethnicity	2.2 (14.8)	2.3 (15)	-0.06	-2.47	0.00	0.76	<0.01
Characteristic of beneficiary's zip code							
Large metro area	48 (50)	46 (50)	2.40	5.00	0.05	0.00	<0.01

	Treatment group mean (SD)	Weighted comparison group mean (SD)	Adjusted difference	Percentage difference	Standardized difference	*t*-test *p*-value	Equivalence *p*-value
Small metro area	21 (41)	21 (41)	-0.17	-0.83	0.00	0.73	<0.01
Non-metro, urban area	23 (42)	25 (43)	-2.19	-9.68	-0.05	0.00	<0.01
Non-metro, rural area	8.7 (28.2)	8.7 (28.2)	-0.03	-0.37	0.00	0.92	<0.01
Social Vulnerability Index summary score of beneficiary's county, mean	0.37 (0.21)	0.36 (0.21)	0.01	3.52	0.06	0.00	0.00
Number of months of full scope Medicaid eligibility in baseline, mean	11 (1)	11 (1)	0.01	0.12	0.01	0.42	<0.01
Medicaid eligibility status at enrollment							
Pregnant	0.9 (9.6)	1 (10.1)	-0.11	-11.58	-0.01	0.38	0.00
Child	38 (49)	38 (48)	0.42	1.10	0.01	0.48	0.00
Adult, non-expansion	16 (36)	16 (36)	-0.06	-0.37	0.00	0.89	0.00
Adult, expansion	32 (47)	32 (47)	0.01	0.03	0.00	0.99	0.00
Disabled	13 (33)	13 (34)	-0.26	-2.07	-0.01	0.50	0.00
Aged	0.3 (5.1)	0.3 (5.1)	0.00	0.45	0.00	0.98	0.00
Enrolled in a comprehensive managed care plan	89 (32)	88 (32)	0.38	0.43	0.01	0.31	0.00
Enrolled in a HCBS waiver or program	4.6 (21)	4.9 (21.6)	-0.31	-6.73	-0.01	0.23	0.00

	Treatment group mean (SD)	Weighted comparison group mean (SD)	Adjusted difference	Percentage difference	Standardized difference	*t*-test *p*-value	Equivalence *p*-value
Behavioral and physical health conditions at enrollment,[a] percentage							
Any behavioral health condition	100 (1)	100 (1)	0.01	0.01	0.01	0.46	<0.01
Any mental health condition	97 (16)	97 (17)	0.07	0.07	0.00	0.72	<0.01
ADHD, conduct disorders, and hyperkinetic syndrome	23 (42)	24 (43)	-0.53	-2.31	-0.01	0.28	<0.01
Anxiety disorder	60 (49)	60 (49)	-0.15	-0.25	0.00	0.79	<0.01
Bipolar disorder	18 (38)	18 (39)	-0.29	-1.61	-0.01	0.53	<0.01
Depressive disorder	58 (49)	57 (49)	0.22	0.38	0.00	0.71	<0.01
Personality disorder	14 (35)	14 (35)	-0.36	-2.56	-0.01	0.37	<0.01
Psychotic disorder	13 (34)	13 (34)	0.40	3.00	0.01	0.32	<0.01
Post-traumatic stress disorder	26 (44)	26 (44)	0.06	0.22	0.00	0.91	<0.01
Other mental health diagnoses[b]	28 (45)	28 (45)	-0.05	-0.17	0.00	0.93	<0.01
Any substance use disorder	32 (47)	32 (47)	0.02	0.06	0.00	0.97	<0.01
Alcohol use disorder	18 (38)	18 (38)	-0.16	-0.89	0.00	0.73	<0.01
Drug use disorder	24 (43)	24 (43)	-0.38	-1.61	-0.01	0.47	<0.01
Opioid use disorder	9.2 (28.9)	9.6 (29.4)	-0.37	-3.98	-0.01	0.29	<0.01

	Treatment group mean (SD)	Weighted comparison group mean (SD)	Adjusted difference	Percentage difference	Standardized difference	*t*-test *p*-value	Equivalence *p*-value
Any physical health condition (among the conditions listed below)	24 (43)	24 (43)	0.19	0.78	0.00	0.71	<0.01
Asthma	7.8 (27)	7.6 (27)	0.13	1.62	0.00	0.70	<0.01
Diabetes	5.8 (23.3)	5.6 (23)	0.19	3.29	0.01	0.49	<0.01
COPD	2.7 (16.1)	2.7 (16.1)	0.01	0.48	0.00	0.94	<0.01
Heart disease	1.8 (13.2)	1.7 (13)	0.04	2.40	0.00	0.78	<0.01
Hypertension	9.5 (29.3)	9.4 (29.2)	0.04	0.42	0.00	0.91	<0.01
Hyperlipidemia	3.8 (19.2)	3.9 (19.4)	-0.08	-2.03	0.00	0.74	<0.01
Obesity	5.9 (23.5)	6 (23.8)	-0.16	-2.75	-0.01	0.57	<0.01
Service use in the baseline year per 1,000 beneficiaries, unless otherwise noted							
All-cause inpatient hospitalizations per 1,000 beneficiaries	317 (954)	324 (1,000)	-7	-2.22	-0.01	0.56	<0.01
BH-related inpatient hospitalizations per 1,000 beneficiaries	291 (926)	295 (951)	-5	-1.62	-0.01	0.68	<0.01
PH-related inpatient hospitalizations per 1,000 beneficiaries	27 (199)	29 (230)	-2	-8.75	-0.01	0.34	<0.01
All-cause ED visits per 1,000 beneficiaries	1,785 (3,549)	1,754 (3,641)	31	1.72	0.01	0.46	<0.01
BH-related ED visits per 1,000 beneficiaries	692 (2,029)	656 (2,097)	36	5.22	0.02	0.14	<0.01
PH-related ED visits per 1,000 beneficiaries	1,093 (2,280)	1,098 (2,280)	-5	-0.50	0.00	0.84	<0.01

	Treatment group mean (SD)	Weighted comparison group mean (SD)	Adjusted difference	Percentage difference	Standardized difference	*t*-test *p*-value	Equivalence *p*-value
Total ambulatory visits per 1,000 beneficiaries	30,924 (40,631)	31,279 (38,875)	-355	-1.15	-0.01	0.46	<0.01
Any inpatient hospitalization, percentage	17 (37)	17 (38)	-0.15	-0.90	0.00	0.74	<0.01
Any ED visit, percentage	53 (50)	53 (50)	-0.47	-0.89	-0.01	0.43	<0.01
All-cause ambulatory visits per 1,000 beneficiaries, in the quarter before enrollment	34,733 (48,157)	34,923 (45,247)	-191	-0.55	0.00	0.73	<0.01
BH-related ambulatory visits per 1,000 beneficiaries, in the quarter before enrollment	23,198 (40,799)	22,991 (37,413)	207	0.89	0.01	0.65	<0.01
All-cause ED visits per 1,000 beneficiaries, in the quarter before enrollment	2,116 (6,277)	2,029 (8,230)	87	4.10	0.01	0.30	<0.01
BH-related ED visits per 1,000 beneficiaries, in the quarter before enrollment	937 (4,686)	863 (7,060)	75	7.97	0.02	0.29	<0.01
All-cause inpatient hospitalizations per 1,000 beneficiaries, in the quarter before enrollment	414 (2,230)	460 (4,657)	-47	-11.26	-0.02	0.28	<0.01
BH-related inpatient hospitalizations per 1,000 beneficiaries, in the quarter before enrollment	385 (2,190)	429 (4,630)	-44	-11.38	-0.02	0.31	<0.01
Any all-cause inpatient hospitalizations in the quarter before enrollment, percentage	7.6 (26.5)	7.6 (26.5)	0.00	0.00	0.00	1.00	<0.01

Source: Mathematica analyses of Minnesota TAF data.

Notes: Standard deviations in parentheses. Standardized difference calculated as the ratio of the treatment–comparison difference and the treatment group standard deviation. *p*-values come from a weighted two-sample *t*-test; equivalence test *p*-values are the greater of the *p*-values for the two one-sided weighted *t*-tests of whether the true treatment–comparison difference exceeded 0.25 standard deviations of the variable. The comparison group means in the table are calculated by weighting observations by the matching weight.

[a] We identified the presence of physical health conditions based on relevant diagnosis codes in the 18 months before enrollment, the maximum amount of baseline TAF data available for beneficiaries with enrollment dates at the start of the demonstration. For behavioral health conditions, we identified these conditions based on relevant diagnosis codes in the 18-month baseline period and within the first month of enrollment. We extended the period for behavioral health conditions to include the first month post-enrollment because some beneficiaries might be newly seeking care for a mental health or substance use disorder condition not identified in their baseline claims data. We aimed to facilitate matching by identifying behavioral health conditions that beneficiaries are seeking care for on or in the first month of enrollment.

[b] Other mental health diagnoses include, for example, those related to intentional self-harm, eating disorders, postpartum depression and puerperal psychosis, adjustment disorders, dissociative and conversion disorders, somatization disorders, hypochondrial disorders, pain disorders related to psychological factors, gender identity disorders, and unspecific mental disorders.

ADHD = attention-deficit/hyperactivity disorder; BH = behavioral health; COPD = chronic obstructive pulmonary disorder; ED = emergency department; HCBS = home- and community-based services; PH = physical health; SD = standard deviation; TAF = Transformed Medicaid Statistical Information System Analytic File.

Appendix Exhibit A.V.2. Baseline characteristics of treatment group and matched comparison group beneficiaries for Nevada

	Treatment group mean (SD)	Weighted comparison group mean (SD)	Adjusted difference	Percentage difference	Standardized difference	*t*-test *p*-value	Equivalence *p*-value
Demographic and eligibility characteristics at enrollment							
Age, mean	30 (13)	31 (15)	-0.85	-2.77	-0.06	0.04	<0.01
Age category							
18 and under	23 (42)	23 (42)	0.00	0.00	0.00	1.00	<0.01
19 and older	77 (42)	77 (42)	0.00	0.00	0.00	1.00	<0.01
Male	47 (50)	46 (50)	0.84	1.79	0.02	0.58	<0.01
Race and ethnicity							
Non-Hispanic White	55 (50)	53 (50)	1.95	3.58	0.04	0.17	<0.01
Non-Hispanic Black	13 (34)	15 (35)	-1.59	-12.16	-0.05	0.14	<0.01
Hispanic	22 (42)	24 (43)	-2.21	-9.94	-0.05	0.06	<0.01
Other races and ethnicities	8.7 (28.2)	6.8 (25.2)	1.89	21.74	0.07	0.02	<0.01
Unknown race and ethnicity	1.4 (11.8)	1.5 (12)	-0.04	-3.12	0.00	0.90	<0.01
Characteristic of beneficiary's zip code							
Large metro area	42 (49)	46 (50)	-4.23	-10.13	-0.09	0.00	<0.01
Small metro area	12 (33)	15 (36)	-2.79	-22.40	-0.08	0.01	<0.01
Non-metro, urban area	45 (50)	38 (48)	7.15	15.98	0.14	0.00	<0.01

	Treatment group mean (SD)	Weighted comparison group mean (SD)	Adjusted difference	Percentage difference	Standardized difference	*t*-test *p*-value	Equivalence *p*-value
Non-metro, rural area	1 (9.8)	1.1 (10.4)	-0.13	-12.88	-0.01	0.67	<0.01
Social Vulnerability Index summary score of beneficiary's county, mean	0.72 (0.15)	0.73 (0.17)	-0.01	-1.75	-0.09	0.01	<0.01
Number of months of full scope Medicaid eligibility in baseline, mean	11 (2)	11 (2)	-0.03	-0.29	-0.02	0.53	<0.01
Medicaid eligibility status at enrollment							
Child	23 (42)	23 (42)	0.33	1.43	0.01	0.79	<0.01
Adult, non-expansion	16 (37)	15 (36)	0.45	2.83	0.01	0.69	<0.01
Adult, expansion	5.5 (22.8)	6.8 (25.2)	-1.30	-23.79	-0.06	0.06	<0.01
Disabled	55 (50)	55 (50)	0.52	0.94	0.01	0.72	<0.01
Percentage enrolled in a comprehensive managed care plan	39 (49)	44 (50)	-4.96	-12.65	-0.10	0.00	<0.01
Behavioral and physical health conditions at enrollment,[a] percentage							
Any behavioral health condition	100 (2)	100 (3)	0.06	0.06	0.03	0.47	<0.01
Any mental health condition	78 (41)	79 (41)	-0.27	-0.34	-0.01	0.82	<0.01
ADHD, conduct disorders, and hyperkinetic syndrome	10 (31)	11 (31)	-0.30	-2.88	-0.01	0.74	<0.01
Anxiety disorder	51 (50)	48 (50)	2.59	5.08	0.05	0.08	<0.01
Bipolar disorder	14 (35)	16 (37)	-1.81	-12.81	-0.05	0.08	<0.01

	Treatment group mean (SD)	Weighted comparison group mean (SD)	Adjusted difference	Percentage difference	Standardized difference	*t*-test *p*-value	Equivalence *p*-value
Depressive disorder	37 (48)	41 (49)	-3.84	-10.37	-0.08	0.01	<0.01
Personality disorder	4.2 (20)	5.3 (22.3)	-1.11	-26.77	-0.06	0.08	<0.01
Psychotic disorder	8 (27.1)	10.1 (30.1)	-2.14	-26.85	-0.08	0.01	<0.01
Post-traumatic stress disorder	15 (35)	16 (37)	-1.71	-11.61	-0.05	0.11	<0.01
Other mental health diagnoses[b]	36 (48)	30 (46)	5.94	16.40	0.12	0.00	<0.01
Any substance use disorder	58 (49)	58 (49)	0.00	0.00	0.00	1.00	<0.01
Alcohol use disorder	28 (45)	31 (46)	-2.72	-9.64	-0.06	0.04	<0.01
Drug use disorder	41 (49)	45 (50)	-3.10	-7.48	-0.06	0.03	<0.01
Opioid use disorder	15 (35)	14 (35)	0.28	1.90	0.01	0.80	<0.01
Any physical health condition (among the conditions listed below)	25 (43)	28 (45)	-3.22	-12.82	-0.07	0.01	<0.01
Asthma	7.6 (26.4)	8.7 (28.1)	-1.11	-14.72	-0.04	0.16	<0.01
Diabetes	4.2 (20.1)	5.2 (22.1)	-0.96	-22.98	-0.05	0.12	<0.01
COPD	2.9 (16.8)	4.1 (19.8)	-1.16	-39.90	-0.07	0.03	<0.01
Heart disease	2.2 (14.7)	2.7 (16.2)	-0.48	-21.67	-0.03	0.31	<0.01
Hypertension	11 (31)	12 (33)	-1.47	-13.61	-0.05	0.13	<0.01

	Treatment group mean (SD)	Weighted comparison group mean (SD)	Adjusted difference	Percentage difference	Standardized difference	*t*-test *p*-value	Equivalence *p*-value
Hyperlipidemia	4.6 (20.9)	6 (23.8)	-1.41	-30.61	-0.07	0.03	<0.01
Obesity	6.3 (24.3)	6.7 (25.1)	-0.42	-6.64	-0.02	0.56	<0.01
Service use in the baseline year 1,000 beneficiaries, (unless otherwise noted)							
All-cause inpatient hospitalizations per 1,000 beneficiaries	303 (909)	356 (1,045)	-53	-17.38	-0.06	0.08	<0.01
BH-related inpatient hospitalizations per 1,000 beneficiaries	268 (859)	318 (989)	-50	-18.64	-0.06	0.08	<0.01
PH-related inpatient hospitalizations per 1,000 beneficiaries	35 (245)	37 (266)	-3	-7.61	-0.01	0.72	<0.01
All-cause ED visits per 1,000 beneficiaries	1,915 (4,229)	2,026 (3,699)	-112	-5.83	-0.03	0.35	<0.01
BH-related ED visits per 1,000 beneficiaries	607 (2,125)	647 (1,693)	-41	-6.73	-0.02	0.47	<0.01
PH-related ED visits per 1,000 beneficiaries	1,308 (2,695)	1,379 (2,807)	-71	-5.41	-0.03	0.39	<0.01
Total ambulatory visits per 1,000 beneficiaries	14,237 (26,439)	14,765 (28,032)	-528	-3.71	-0.02	0.51	<0.01
Any inpatient hospitalization, percentage	15.69 (36.38)	17.96 (38.4)	-2.28	-14.51	-0.06	0.04	<0.01
Any ED visit, percentage	55.41 (49.72)	56.94 (49.53)	-1.52	-2.75	-0.03	0.30	<0.01
All-cause ambulatory visits per 1,000 beneficiaries, in the quarter before enrollment	16,096 (31,937)	17,413 (35,578)	-1,318	-8.19	-0.04	0.18	<0.01
BH-related ambulatory visits per 1,000 beneficiaries, in the quarter before enrollment	10,781 (27,402)	11,456 (31,009)	-675	-6.26	-0.02	0.43	<0.01
All-cause ED visits per 1,000 beneficiaries, in the quarter before enrollment	2,252 (6,013)	2,320 (5,069)	-68	-3.03	-0.01	0.69	<0.01

	Treatment group mean (SD)	Weighted comparison group mean (SD)	Adjusted difference	Percentage difference	Standardized difference	*t*-test *p*-value	Equivalence *p*-value
BH-related ED visits per 1,000 beneficiaries, in the quarter before enrollment	842 (3,155)	855 (2,581)	-13	-1.56	0.00	0.88	<0.01
All-cause inpatient hospitalizations per 1,000 beneficiaries, in the quarter before enrollment	444 (1,833)	516 (1,930)	-72	-16.19	-0.04	0.21	<0.01
BH-related inpatient hospitalizations per 1,000 beneficiaries, in the quarter before enrollment	392 (1,635)	465 (1,760)	-73	-18.49	-0.04	0.15	<0.01

Source: Mathematica analyses of Nevada TAF data.

Notes: Standard deviations in parentheses. Standardized difference calculated as the ratio of the treatment–comparison difference and the treatment group standard deviation. *p*-values come from a weighted two-sample *t*-test; equivalence test *p*-values are the greater of the *p*-values for the two one-sided weighted *t*-tests of whether the true treatment–comparison difference exceeded 0.25 standard deviations of the variable. The comparison group means in the table are calculated by weighting observations by the matching weight.

[a] We identified the presence of physical health conditions based on relevant diagnosis codes over the 24-months before the enrollment date. For behavioral health conditions, we identified these conditions based on relevant diagnosis codes in the 24 months before enrollment and within the first month of enrollment. We extended the period for behavioral health conditions to include the first month post-enrollment because some beneficiaries might be newly seeking care for a mental health or substance use disorder condition not identified in their baseline claims data. We aimed to facilitate matching by identifying behavioral health conditions that beneficiaries are seeking care for on or in the first month of enrollment.

[b] Other mental health diagnoses include, for example, those related to intentional self-harm, eating disorders, postpartum depression and puerperal psychosis, adjustment disorders, dissociative and conversion disorders, somatization disorders, hypochondrial disorders, pain disorders related to psychological factors, gender identity disorders, and unspecific mental disorders.

ADHD = attention-deficit/hyperactivity disorder; BH = behavioral health; COPD = chronic obstructive pulmonary disorder; ED = emergency department; HCBS = home- and community-based services; PH = physical health; SD = standard deviation; TAF = Transformed Medicaid Statistical Information System Analytic File.

Appendix Exhibit A.V.3. Baseline characteristics of treatment group and matched comparison group beneficiaries for Oklahoma

	Treatment group mean (SD)	Comparison pool mean (SD)	Adjusted difference	Percentage difference	Standardized difference	*t*-test *p*-value	Equivalence *p*-value
Demographic and enrollment characteristics at demonstration enrollment							
Age, mean	21 (16)	21 (16)	-0.11	-0.50	-0.01	0.60	<0.01
Age category							
18 and under	63 (48)	63 (48)	0.00	0.00	0.00	1.00	<0.01
19 to 34	16 (37)	16 (37)	0.03	0.16	0.00	0.96	<0.01
35 to 49	12 (32)	12 (32)	0.21	1.77	0.01	0.61	<0.01
50 and older	8.4 (27.7)	8.6 (28.1)	-0.24	-2.81	-0.01	0.53	<0.01
Male	46 (50)	44 (50)	2.17	4.68	0.04	0.00	<0.01
Race and ethnicity							
Non-Hispanic White	53 (50)	54 (50)	-0.50	-0.94	-0.01	0.45	<0.01
Non-Hispanic Black	12 (32)	12 (32)	-0.21	-1.82	-0.01	0.61	<0.01
Hispanic	10 (30)	11 (31)	-1.05	-10.85	-0.04	0.01	<0.01
Other races and ethnicities	21 (41)	20 (40)	1.56	7.35	0.04	0.00	<0.01
Unknown race and ethnicity	4.3 (20.3)	4.1 (19.9)	0.20	4.66	0.01	0.45	<0.01
Characteristic of beneficiary's zip code							
Large metro area	39 (49)	41 (49)	-1.71	-4.37	-0.04	0.01	<0.01

	Treatment group mean (SD)	Comparison pool mean (SD)	Adjusted difference	Percentage difference	Standardized difference	*t*-test *p*-value	Equivalence *p*-value
Small metro area	12 (33)	14 (35)	-2.18	-18.09	-0.07	0.00	<0.01
Non-metro, urban area	48 (50)	44 (50)	4.09	8.49	0.08	0.00	<0.01
Non-metro, rural area	0.5 (6.9)	0.7 (8.2)	-0.20	-41.21	-0.03	0.05	<0.01
Social Vulnerability Index summary score of beneficiary's county, mean	0.7 (0.2)	0.72 (0.19)	-0.01	-2.13	-0.08	0.00	0.00
Number of months of full scope Medicaid eligibility in baseline, mean	11 (1)	11 (1)	-0.04	-0.38	-0.03	0.02	<0.01
Medicaid eligibility status at enrollment							
Pregnant	2.3 (15)	2.5 (15.6)	-0.19	-8.37	-0.01	0.35	<0.01
Child	64 (48)	64 (48)	0.02	0.03	0.00	0.98	<0.01
Adult, non-expansion	13 (34)	12 (33)	0.50	3.90	0.02	0.25	<0.01
Disabled	20 (40)	20 (40)	-0.36	-1.81	-0.01	0.50	<0.01
Aged	0.3 (5.1)	0.2 (4.8)	0.03	13.33	0.01	0.60	<0.01
Enrolled in a primary care case management program	82 (38)	81 (39)	0.95	1.15	0.02	0.06	0.00
Enrolled in a HCBS waiver or program	1.0 (9.8)	1.8 (13.2)	-0.80	-83.03	-0.08	0.00	<0.01
Behavioral and physical health conditions at enrollment,[a] percentage							
Any behavioral health condition	100 (2)	100 (2)	0.01	0.01	0.01	0.56	<0.01
Any mental health condition	98 (14)	98 (12)	-0.48	-0.49	-0.03	0.01	<0.01

	Treatment group mean (SD)	Comparison pool mean (SD)	Adjusted difference	Percentage difference	Standardized difference	*t*-test *p*-value	Equivalence *p*-value
ADHD, conduct disorders, and hyperkinetic syndrome	32 (47)	32 (47)	-0.17	-0.52	0.00	0.78	<0.01
Anxiety disorder	48 (50)	49 (50)	-0.97	-2.03	-0.02	0.15	<0.01
Bipolar disorder	20 (40)	22 (41)	-2.02	-10.33	-0.05	0.00	<0.01
Depressive disorder	46 (50)	46 (50)	-0.72	-1.58	-0.01	0.27	<0.01
Personality disorder	3.5 (18.5)	3.9 (19.4)	-0.38	-10.59	-0.02	0.14	<0.01
Psychotic disorder	14 (35)	12 (33)	1.93	13.47	0.06	0.00	<0.01
Post-traumatic stress disorder	24 (43)	21 (41)	2.86	11.75	0.07	0.00	<0.01
Other mental health diagnoses[b]	33 (47)	38 (49)	-4.66	-14.01	-0.10	0.00	<0.01
Any substance use disorder	17 (38)	17 (38)	0.00	-0.02	0.00	1.00	<0.01
Alcohol use disorder	3.4 (18.2)	4.2 (20.2)	-0.82	-23.98	-0.05	0.00	<0.01
Drug use disorder	15 (36)	15 (35)	0.38	2.51	0.01	0.42	<0.01
Opioid use disorder	4.3 (20.2)	4 (19.7)	0.23	5.37	0.01	0.36	<0.01
Any physical health condition (among the conditions listed below)	23 (42)	24 (42)	-0.94	-4.15	-0.02	0.09	<0.01
Asthma	8.9 (28.4)	9.4 (29.2)	-0.56	-6.33	-0.02	0.15	<0.01
Diabetes	4.7 (21.2)	5 (21.9)	-0.33	-7.02	-0.02	0.24	<0.01

	Treatment group mean (SD)	Comparison pool mean (SD)	Adjusted difference	Percentage difference	Standardized difference	*t*-test *p*-value	Equivalence *p*-value
COPD	3.9 (19.3)	4.3 (20.3)	-0.42	-10.90	-0.02	0.10	<0.01
Heart disease	2.2 (14.5)	2.5 (15.5)	-0.31	-14.37	-0.02	0.11	<0.01
Hypertension	9.4 (29.2)	10.2 (30.3)	-0.76	-7.99	-0.03	0.05	<0.01
Hyperlipidemia	4.4 (20.6)	4.4 (20.6)	0.01	0.33	0.00	0.96	<0.01
Obesity	4.7 (21.1)	4.9 (21.7)	-0.24	-5.18	-0.01	0.40	<0.01
Service use in the baseline year 1,000 beneficiaries, (unless otherwise noted)							
All-cause inpatient hospitalizations per 1,000 beneficiaries	301 (855)	309 (881)	-8.12	-2.69	-0.01	0.48	<0.01
BH-related inpatient hospitalizations per 1,000 beneficiaries	254 (791)	253 (793)	1.21	0.47	0.00	0.91	<0.01
PH-related inpatient hospitalizations per 1,000 beneficiaries	47 (274)	56 (310)	-9.32	-19.82	-0.03	0.02	<0.01
All-cause ED visits per 1,000 beneficiaries	1,366 (2,761)	1,405 (3,528)	-39.63	-2.90	-0.01	0.36	<0.01
BH-related ED visits per 1,000 beneficiaries	278 (988)	259 (1,173)	18.49	6.65	0.02	0.21	<0.01
PH-related ED visits per 1,000 beneficiaries	1,088 (2,227)	1,146 (2,888)	-58.11	-5.34	-0.03	0.10	<0.01
Total ambulatory visits per 1,000 beneficiaries	17,744 (23,096)	20,329 (25,341)	-2,584.87	-14.57	-0.11	0.00	<0.01
Any inpatient hospitalization, percentage	18 (39)	19 (39)	-0.44	-2.40	-0.01	0.40	<0.01
Any ED visit, percentage	49 (50)	49 (50)	-0.13	-0.26	0.00	0.85	<0.01

	Treatment group mean (SD)	Comparison pool mean (SD)	Adjusted difference	Percentage difference	Standardized difference	*t*-test *p*-value	Equivalence *p*-value
All-cause ambulatory visits per 1,000 beneficiaries, in the quarter before enrollment	18,070 (24,666)	20,889 (26,751)	-2,818.93	-15.60	-0.11	0.00	<0.01
BH-related ambulatory visits per 1,000 beneficiaries, in the quarter before enrollment	11,942 (20,983)	13,938 (22,953)	-1,995.99	-16.71	-0.10	0.00	<0.01
All-cause ED visits per 1,000 beneficiaries, in the quarter before enrollment	1,588 (3,902)	1,569 (4,647)	18.73	1.18	0.00	0.75	<0.01
BH-related ED visits per 1,000 beneficiaries, in the quarter before enrollment	382 (1,591)	337 (1,655)	44.40	11.63	0.03	0.04	<0.01
All-cause inpatient hospitalizations per 1,000 beneficiaries, in the quarter before enrollment	460 (1,707)	459 (1,619)	1.25	0.27	0.00	0.95	<0.01
BH-related inpatient hospitalizations per 1,000 beneficiaries, in the quarter before enrollment	414 (1,635)	399 (1,503)	14.32	3.46	0.01	0.50	<0.01
Any all-cause inpatient hospitalization, in the quarter before enrollment, percentage	9.5 (29.3)	9.5 (29.3)	0.00	0.00	0.00	1.00	<0.01

Source: Mathematica analyses of Oklahoma TAF data.

Notes: Standard deviations in parentheses. Standardized difference calculated as the ratio of the treatment–comparison difference and the treatment group standard deviation. *p*-values come from a weighted two-sample *t*-test; equivalence test *p*-values are the greater of the *p*-values for the two one-sided weighted *t*-tests of whether the true treatment–comparison difference exceeded 0.25 standard deviations of the variable. The comparison group means in the table are calculated by weighting observations by the matching weight.

[a] We identified the presence of physical health conditions based on relevant diagnosis codes over the 24-months before the enrollment date. For behavioral health conditions, we identified these conditions based on relevant diagnosis codes in the 24 months before enrollment and within the first month of enrollment. We extended the period for behavioral health conditions to include the first month post-enrollment because some beneficiaries might be newly seeking care for a mental health or substance use disorder condition not identified in their baseline claims data. We aimed to facilitate matching by identifying behavioral health conditions that beneficiaries are seeking care for on or in the first month of enrollment.

[b] Other mental health diagnoses include, for example, those related to intentional self-harm, eating disorders, postpartum depression and puerperal psychosis, adjustment disorders, dissociative and conversion disorders, somatization disorders, hypochondrial disorders, pain disorders related to psychological factors, gender identity disorders, and unspecific mental disorders.

ADHD = attention-deficit/hyperactivity disorder; BH = behavioral health; COPD = chronic obstructive pulmonary disorder; ED = emergency department; HCBS = home- and community-based services; PH = physical health; SD = standard deviation; TAF = Transformed Medicaid Statistical Information System Analytic File.

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VI. Impacts analysis

A. Methods for estimating impacts

The difference-in-differences model estimates the impact of the demonstration as the difference between the average change over time for treatment beneficiaries and the average change over time for the matched comparison beneficiaries. Impact estimates based on the difference-in-differences framework assume parallel trends for the treatment and comparison groups at baseline. That is, the difference-in-differences estimates are likely to be unbiased as long as there were no significant differences in outcome trends between the treatment and comparison groups at baseline, or reason to suspect that trends would differ for the two groups had the intervention not occurred.

We examined the parallel trends assumption visually using line plots for each state after propensity score matching. There were no obvious violations in our final matched samples (there is no statistical test for parallel trends). Similarly, we examined plots for regression to the mean issues. Regression to the mean can occur in matching when extreme comparisons are selected to achieve balance on a baseline variable (particularly the baseline level of an outcome) and then the levels of these comparisons regress back to their mean during the intervention period, biasing the estimated treatment effect (Daw & Hatfield 2018). There was no obvious regression to the mean in the final matched data of any state.

We observed each beneficiary at least once in the baseline period and again at least once in the demonstration period. For each outcome, we used a single linear regression model using ordinary least squares and included all pre- and post-demonstration observations available for each beneficiary in the sample to estimate impacts jointly for the two 12-month intervals over which we followed beneficiaries during the demonstration period. Equation (1) specifies the regression model used to estimate the impact of the program for continuous outcomes such as number of hospitalizations.

$$(1) \qquad y_{it} = \alpha + b_i + \gamma_t * p_t + \theta_t * treatment_i * p_t + \beta * covid_{it} + \varepsilon_{it}$$

Where y_{it} represents a claims-based outcome variable for beneficiary i in time period t; α is a constant term; b_i is a beneficiary-level fixed effect for beneficiary i, which controls for all time invariant beneficiary characteristics; p_t (for "post") is an intervention-period indicator that takes the value of 1 during a specific intervention period, for instance, the first twelve-month period after demonstration enrollment date, and 0 otherwise; and $treatment_i$ is a binary indicator of intervention status; the indicator takes the value of 1 if beneficiary i is in the treatment group, and is otherwise 0. The main effect of this indicator is not identified in this equation since it is collinear with the beneficiary fixed effects. $covid_{it}$ represents a vector of time-varying county-level variables to adjust for changes in outcomes associated with the COVID-19 pandemic. The variables within this vector include the mean county-level pandemic vulnerability index over the time period, the number of COVID-19-related deaths per 100,000 individuals on the last day of the time period, and an indicator variable for whether any day in the time period falls during the pandemic-related period included in the analysis (March 11, 2020 to December 31, 2021). ε_{it} is the idiosyncratic error term. It represents unexplained variability in the outcome variable for beneficiary i during period t.

The Greek letters are the estimated parameters. For example, the intervention period-specific coefficients γ_t capture changes experienced by the comparison group between follow-up interval t and the baseline.

The θ_t coefficients are the interval-specific difference-in-differences impact estimates for beneficiaries. β is a vector of coefficients representing the effects of the COVID-19-related variables.

We also modeled binary service use and quality measure outcomes in the difference-in-differences framework using ordinary least squares. For these models, however, we did not use beneficiary fixed effects (Karaca-Mandic, Norton, and Dowd, 2012) and instead controlled for a range of beneficiary characteristics at baseline to adjust for any residual imbalance between the groups after matching, including characteristics such as age, sex, race and ethnicity, Medicaid eligibility category, and presence of specific behavioral health and physical health conditions (listed in Appendix Exhibit A.IV.1.).

In all models, we adjusted standard errors for multiple observations for the same beneficiary to allow for serial correlation of the outcomes within individual beneficiaries over time in our longitudinal data set. The models were also weighted by an analytic weight that is the product of the matching weights from the propensity score models described above and an eligibility weight. The eligibility weights account for the number of months the beneficiary was observable in the enrollment and claims data from the start to the end of the period. Beneficiaries were observable in a month if they were alive and enrolled in only Medicaid (that is, not dually eligible or with other health insurance coverage) with full benefits.

For the Antidepressant Medication Management measure, we used an intervention period-only model because we measured this outcome in the year after the first visit only. This model controlled for beneficiaries' characteristics at baseline to adjust for any residual imbalance across groups after weighting or matching (listed in Appendix Exhibit A.IV.1). Unlike in Equation (1), this model included the main effect of treatment status.

We conducted two sensitivity analyses to verify the robustness of the impact estimates of the continuous outcome variables in the main models. First, we extended the baseline period to include the full two years before the intervention start date—as opposed to only one year as in the main impact analysis. We otherwise estimated demonstration impacts using the same specification as in the main analysis. This sensitivity analysis provides insight into the robustness of the impact estimates to the length of the baseline period. If trends in outcomes for the treatment and comparison groups were not parallel during the baseline period, the impact estimates would be likely to change substantially as the baseline period extends back an additional year. In practice, increasing the length of the baseline period had little effect on the impact estimates in nearly all cases.

Second, we examined the sensitivity of the results to outliers by top-coding outcome variables for both the treatment and comparison groups at the 99th percentile of the outcome distribution in the entire matched sample observed over a two-year period (one year before and after the first visit to a CCBHC or other community behavioral health clinic). That is, all values above the 99th percentile were replaced with the value of the outcome variable at the 99th percentile and then the models were estimated using the top coded variables. Again, this generally had little effect on the impact estimates, suggesting robust results.

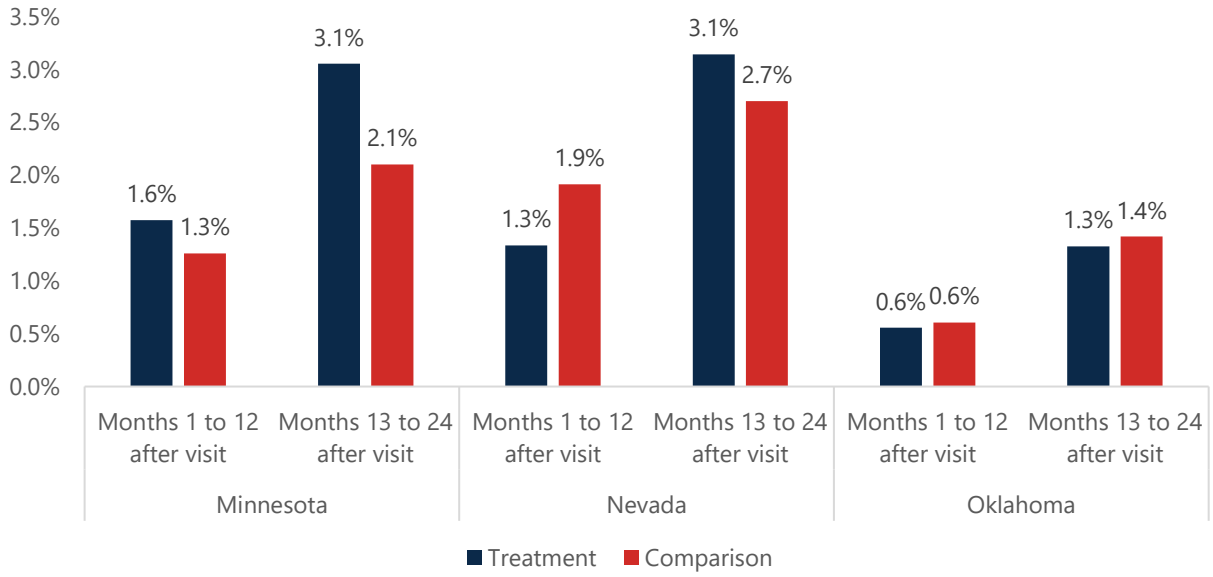
Finally, we also estimated difference-in-differences models separately for the following subgroups: (1) by demonstration year of the first visit to a CCBHC or other community behavioral health clinic; (2) adults; (3) children and adolescents; and (4) people with SUD. To estimate impacts for the first group – that is, by

demonstration year of the first visit – we fit the original difference-in-differences models separately for each cohort of beneficiaries with a first visit in the relevant demonstration year.[56] For analyses of the adult, child and adolescent, and people with SUD subgroups we modified the original difference-in-differences models to include two-way interactions between a binary indicator for the subgroup and the post-period year indicators and three-way interactions between the binary indicator for the subgroup, the treatment status indicator, and the post-period year indicators. The main effect for the subgroup indicator was not included since it was colinear with the beneficiary fixed effects.

B. Descriptive analyses of COVID-19-related hospitalizations and ED visits

The analysis period covers time before and during the COVID-19 pandemic. Because our estimates of impacts on service use could be influenced by different rates of COVID-19 in the treatment and comparison groups, we assessed whether the percentage of treatment and comparison groups with any COVID-19-related hospitalizations or ED visits (hereafter COVID-related hospital use) in the study period differed for the subgroups with a first visit to a CCBHC or comparison clinic in DY3 and DY4 (that is, the subgroups with the most time in the COVID-19 period). Exhibits A.VI.1-2 show the percentages of treatment and comparison beneficiaries who had COVID-19 related hospital use during the COVID-19 pandemic period among beneficiaries with a first visit in DYs 3 and 4.

Appendix Exhibit A.VI.1. Percentage of treatment and comparison group with COVID-19-related hospital use among beneficiaries with a first visit in DY3



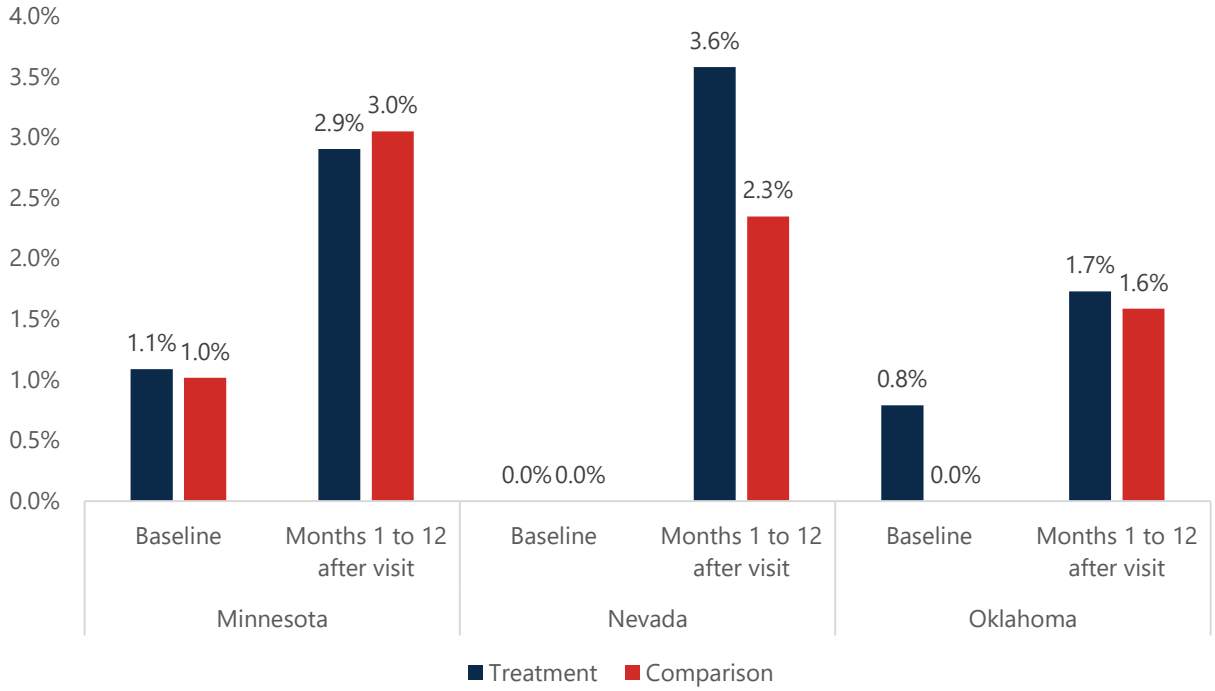
Source: Mathematica analyses of Minnesota, Nevada, and Oklahoma TAF data, 2019 – 2020

[56] We required matched pairs to have a first visit to a CCBHC (treatment group) or other community behavioral health clinic (comparison group) within 60 days of each other. For any matched sets where the 60-day window crossed demonstration years (for example, a treatment group beneficiary had a first visit date in demonstration year one and their matched comparison beneficiary had a first visit date in demonstration year two), we assigned the matched set to the demonstration year of the treatment group beneficiary.

Note: Beneficiaries with a first visit in DY3 had first visits between July 1, 2019 and June 30, 2020 in Minnesota and Nevada and between April 1, 2019 and March 31, 2020 in Oklahoma. The figure includes the period of time most affected by COVID-19 (months 1 to 24 after the first visit for this subgroup).

DY = demonstration year

Appendix Exhibit A.VI.2. Percentage of treatment and comparison group with COVID-19-related hospital use among beneficiaries with a first visit in DY4



Source: Mathematica analyses of Minnesota, Nevada, and Oklahoma TAF data, 2020 – 2021

Note: Beneficiaries with a first visit in demonstration year four had a visit between July 1, 2020, and December 31, 2020, in Minnesota and Nevada and between April 1, 2020, and December 31, 2020, in Oklahoma. The figure includes the time period most affected by COVID-19 (the baseline and follow-up year for this subgroup).

DY = demonstration year

VII. Impact analysis results tables

This section provides detailed results from the impact analyses, by state and outcome, for the full analysis population (Exhibits A.VII.1 – A.VII.8) and by subgroup (Exhibits A.VII.9 – A.VII.22). There is no exhibit for impacts on costs by subgroup in Nevada to reduce risk of reporting proprietary managed care payment information. There is also no exhibit for impacts on quality measures by subgroup in Nevada because of small denominator sizes for many of the measures.

Appendix Exhibit A.VII.1. Impacts on measures of service use among the full analysis population: Minnesota

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Inpatient hospitalizations					
All-cause hospitalizations per 1,000 beneficiaries per year					
Baseline year	308	315			
Months 1-12	268	275	0.05 (11)	<1%	1.00
Months 13-24	258	241	24 (12)	11%	0.05
Cumulative (months 1-24)	263	260	9.0 (10)	3.6%	0.37
Behavioral health-related hospitalizations per 1,000 beneficiaries per year[a]					
Baseline year	282	286			
Months 1-12	246	249	0.61 (10)	<1%	0.95
Months 13-24	234	215	23 (12)	12%	0.06
Cumulative (months 1-24)	240	234	8.9 (9.6)	4.0%	0.35
Physical health-related hospitalizations per 1,000 beneficiaries per year[a]					
Baseline year	26	29			
Months 1-12	22	25	-0.56 (2.8)	-2.5%	0.84
Months 13-24	25	26	1.2 (3.1)	5.2%	0.71
Cumulative (months 1-24)	23	26	0.04 (2.5)	<1%	0.99
Percentage with any hospitalization					
Baseline year	18	18			
Months 1-12	16	16	0.26 (0.50)	1.7%	0.59
Months 13-24	15	14	1.1 (0.54)*	8.3%	0.04
Cumulative (months 1-24)	25	24	0.71 (0.55)	2.9%	0.19
ED visits					
All-cause ED visits per 1,000 beneficiaries per year					
Baseline year	1,758	1,735			
Months 1-12	1,604	1,527	54 (33)	3.5%	0.10
Months 13-24	1,495	1,338	135 (44)**	10%	<0.01
Cumulative (months 1-24)	1,555	1,445	87 (34)**	6.0%	<0.01
Behavioral health-related ED visits per 1,000 beneficiaries per year[a]					
Baseline year	675	641			
Months 1-12	606	561	12 (20)	2.0%	0.55

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	545	446	66 (26)*	14%	0.01
Cumulative (months 1-24)	578	512	32 (20)	5.9%	0.10
Physical health-related ED visits per 1,000 beneficiaries per year[a]					
Baseline year	1,083	1,093			
Months 1-12	998	966	42 (23)	4.4%	0.07
Months 13-24	950	892	69 (29)*	8.0%	0.02
Cumulative (months 1-24)	977	932	55 (23)*	6.0%	0.02
Percentage with any ED visit					
Baseline year	54	55			
Months 1-12	51	50	2.3 (0.63)***	4.7%	<0.01
Months 13-24	46	46	0.98 (0.71)	2.1%	0.17
Cumulative (months 1-24)	66	65	1.6 (0.62)**	2.5%	<0.01
Ambulatory visits					
All-cause ambulatory visits per 1,000 beneficiaries per year					
Baseline year	31,450	31,905			
Months 1-12	45,832	45,769	518 (422)	1.1%	0.22
Months 13-24	37,164	37,221	398 (571)	1.0%	0.49
Cumulative (months 1-24)	42,225	42,247	432 (430)	1.0%	0.32
Behavioral health-related ambulatory visits per 1,000 beneficiaries per year[a]					
Baseline year	20,676	20,654			
Months 1-12	33,591	32,281	1,287 (372)***	4.0%	<0.01
Months 13-24	25,693	24,501	1,170 (492)*	4.5%	0.02
Cumulative (months 1-24)	30,311	29,063	1,225 (375)**	4.1%	<0.01
Physical health-related ambulatory visits per 1,000 beneficiaries per year[a]					
Baseline year	10,774	11,251			
Months 1-12	12,242	13,488	-769 (189)***	-5.9%	<0.01
Months 13-24	11,471	12,720	-772 (270)**	-6.1%	<0.01
Cumulative (months 1-24)	11,914	13,184	-793 (198)***	-6.2%	<0.01

Source: Mathematica analyses of Minnesota TAF data, 2016 - 2021.

Note: The full analysis population included all beneficiaries who had a first visit to a CCBHC (treatment group) or other behavioral health clinic (comparison group) between the start date of the demonstration, July 1, 2017, and December 31, 2020. We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] We identified stays and visit as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health related. For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

CCBHC = certified community behavioral health clinic; ED = emergency department; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.2. Impacts on measures of service use among the full analysis population: Nevada

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Inpatient hospitalizations					
All-cause hospitalizations per 1,000 beneficiaries per year					
Baseline year	302	356			
Months 1-12	243	393	-96 (32)**	-28%	<0.01
Months 13-24	272	370	-44 (45)	-14%	0.33
Cumulative (months 1-24)	254	383	-75 (32)*	-23%	0.02
Behavioral health-related hospitalizations per 1,000 beneficiaries per year[a]					
Baseline year	268	318			
Months 1-12	206	354	-99 (31)**	-32%	<0.01
Months 13-24	243	322	-30 (43)	-11%	0.49
Cumulative (months 1-24)	220	342	-72 (30)*	-24%	0.02
Physical health-related hospitalizations per 1,000 beneficiaries per year[a]					
Baseline year	34	38			
Months 1-12	37	39	2.8 (8.8)	8.9%	0.75
Months 13-24	30	48	-14 (11)	-34%	0.21
Cumulative (months 1-24)	34	41	-3.0 (8.1)	-8.5%	0.72
Percentage with any hospitalization					
Baseline year	17	18			
Months 1-12	15	18	-2.5 (1.4)	-14%	0.07
Months 13-24	14	14	0.44 (1.7)	3.3%	0.79
Cumulative (months 1-24)	24	27	-2.8 (1.6)	-10%	0.08
ED visits					
All-cause ED visits per 1,000 beneficiaries per year					
Baseline year	1,918	1,973			
Months 1-12	1,630	1,826	-141 (115)	-8.0%	0.22
Months 13-24	1,279	1,456	-121 (133)	-8.2%	0.36
Cumulative (months 1-24)	1,520	1,688	-113 (104)	-6.9%	0.28
Behavioral health-related ED visits per 1,000 beneficiaries per year[a]					
Baseline year	613	624			
Months 1-12	512	652	-128 (60)*	-20%	0.03
Months 13-24	446	479	-22 (73)	-4.2%	0.77
Cumulative (months 1-24)	495	589	-82 (55)	-14%	0.14

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Physical health-related ED visits per 1,000 beneficiaries per year[a]					
Baseline year	1,305	1,348			
Months 1-12	1,118	1,174	-13 (78)	-1.1%	0.87
Months 13-24	834	977	-100 (98)	-10%	0.31
Cumulative (months 1-24)	1,025	1,099	-31 (73)	-2.9%	0.67
Percentage with any ED visit					
Baseline year	58	59			
Months 1-12	54	54	0.17 (1.8)	<1%	0.92
Months 13-24	45	46	0.09 (2.2)	<1%	0.97
Cumulative (months 1-24)	68	69	-0.45 (1.7)	<1%	0.80
Ambulatory visits					
All-cause ambulatory visits per 1,000 beneficiaries per year					
Baseline year	14,366	15,269			
Months 1-12	32,736	27,897	5,742 (1,063)***	22%	<0.01
Months 13-24	14,240	15,337	-194 (1,244)	-1.1%	0.88
Cumulative (months 1-24)	26,587	24,018	3,472 (983)***	15%	<0.01
Behavioral health-related ambulatory visits per 1,000 beneficiaries per year[a]					
Baseline year	9,352	9,867			
Months 1-12	26,938	21,956	5,497 (978)***	26%	<0.01
Months 13-24	10,448	10,792	170 (1,127)	1.4%	0.88
Cumulative (months 1-24)	21,475	18,548	3,442 (889)***	19%	<0.01
Physical health-related ambulatory visits per 1,000 beneficiaries per year[a]					
Baseline year	5,014	5,402			
Months 1-12	5,797	5,940	245 (367)	4.5%	0.50
Months 13-24	3,792	4,545	-364 (503)	-7.5%	0.47
Cumulative (months 1-24)	5,113	5,470	30 (371)	<1%	0.93

Source: Mathematica analyses of Nevada TAF data, 2015 - 2021.

Note: The full analysis population included all beneficiaries who had a first visit to a CCBHC (treatment group) or other behavioral health clinic (comparison group) between the start date of the demonstration, July 1, 2017, and December 31, 2020. We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

a We identified stays and visit as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health related.

For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

CCBHC = certified community behavioral health clinic; ED = emergency department; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.3. Impacts on measures of service use among the full analysis population: Oklahoma

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	p-value
Inpatient hospitalizations					
All-cause hospitalizations per 1,000 beneficiaries per year					
Baseline year	291	299			
Months 1-12	235	251	-8.0 (12)	-3.4%	0.51
Months 13-24	204	215	-3.0 (14)	-1.6%	0.83
Cumulative (months 1-24)	222	236	-6.0 (11)	-2.7%	0.60
Behavioral health-related hospitalizations per 1,000 beneficiaries per year[a]					
Baseline year	246	247			
Months 1-12	203	207	-3.3 (11)	-1.6%	0.77
Months 13-24	165	168	-3.2 (13)	-2.0%	0.81
Cumulative (months 1-24)	187	191	-3.7 (10)	-2.0%	0.72
Physical health-related hospitalizations per 1,000 beneficiaries per year[a]					
Baseline year	44	52			
Months 1-12	32	44	-4.7 (4.3)	-14%	0.27
Months 13-24	39	47	0.12 (5.2)	<1%	0.98
Cumulative (months 1-24)	35	45	-2.3 (4.0)	-6.7%	0.57
Percentage with any hospitalization					
Baseline year	19	18			
Months 1-12	14	14	0.22 (0.64)	1.6%	0.73
Months 13-24	12	11	0.93 (0.69)	8.3%	0.18
Cumulative (months 1-24)	22	21	0.56 (0.70)	2.6%	0.42
ED visits					
All-cause ED visits per 1,000 beneficiaries per year					
Baseline year	1,351	1,384			
Months 1-12	1,297	1,255	75 (33)*	6.3%	0.02
Months 13-24	1,098	1,144	-13 (45)	-1.1%	0.78
Cumulative (months 1-24)	1,216	1,210	39 (33)	3.4%	0.23
Behavioral health-related ED visits per 1,000 beneficiaries per year[a]					
Baseline year	271	253			
Months 1-12	277	232	27 (14)*	11%	0.05
Months 13-24	253	221	14 (16)	6.3%	0.39
Cumulative (months 1-24)	266	227	21 (13)	9.0%	0.09
Physical health-related ED visits per 1,000 beneficiaries per year[a]					
Baseline year	1,079	1,131			
Months 1-12	1,020	1,023	48 (28)	5.1%	0.08
Months 13-24	845	923	-27 (39)	-3.0%	0.49
Cumulative (months 1-24)	949	983	18 (28)	2.0%	0.51

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	p-value
Percentage with any ED visit					
Baseline year	50	50			
Months 1-12	48	44	3.7 (0.79)***	8.2%	<0.01
Months 13-24	43	40	2.2 (0.90)*	5.2%	0.02
Cumulative (months 1-24)	64	59	4.0 (0.78)***	6.8%	<0.01

Source: Mathematica analyses of Oklahoma TAF data, 2015 - 2021.

Note: The full analysis population included all beneficiaries who had a first visit to a CCBHC (treatment group) or other behavioral health clinic (comparison group) between the start date of the demonstration, April 1, 2017, and December 31, 2020. We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] We identified stays and visit as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health related. For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

CCBHC = certified community behavioral health clinic; ED = emergency department; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.4. Impacts on Medicaid costs among the full analysis population: Nevada

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	p-value
Total Medicaid costs					
Total costs per beneficiary per month (PBPM)					
Baseline year	621	828			
Months 1-12	975	1,035	148 (65)*	18%	0.02
Months 13-24	727	840	94 (86)	15%	0.27
Cumulative (months 1-24)	891	966	132 (68)	17%	0.05
Total behavioral health-related costs PBPM[a]					
Baseline year	311	338			
Months 1-12	588	523	92 (35)**	18%	<0.01
Months 13-24	381	421	-13 (43)	-3.4%	0.76
Cumulative (months 1-24)	518	489	56 (32)	12%	0.08
Total physical health-related costs PBPM[a]					
Baseline year	215	377			
Months 1-12	238	367	33 (54)	16%	0.54
Months 13-24	208	275	94 (79)	91%	0.23
Cumulative (months 1-24)	229	335	55 (63)	33%	0.38
Medicaid costs for inpatient hospitalizations					
Costs for all-cause hospitalizations PBPM					
Baseline year	183	257			
Months 1-12	138	234	-22 (50)	-13%	0.67
Months 13-24	168	202	40 (68)	36%	0.55
Cumulative (months 1-24)	148	220	2.3 (55)	1.6%	0.97
Costs for behavioral health-related hospitalizations PBPM[a]					
Baseline year	167	181			
Months 1-12	115	201	-73 (28)**	-37%	<0.01
Months 13-24	134	167	-20 (34)	-12%	0.55
Cumulative (months 1-24)	121	188	-54 (25)*	-30%	0.03
Costs for physical health-related hospitalizations PBPM[a]					
Baseline year	16	77			
Months 1-12	23	33	51 (46)	-180%	0.27
Months 13-24	34	34	60 (64)	-129%	0.34
Cumulative (months 1-24)	27	32	56 (53)	-153%	0.29

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	p-value
Medicaid costs for ED visits					
Costs for all-cause ED visits PBPM					
Baseline year	51	62			
Months 1-12	45	58	-1.6 (3.9)	-3.5%	0.68
Months 13-24	35	45	1.3 (4.6)	3.6%	0.78
Cumulative (months 1-24)	42	54	-0.21 (3.6)	<1%	0.95
Costs for behavioral health-related ED visits PBPM[a]					
Baseline year	16	21			
Months 1-12	14	21	-2.4 (2.1)	-15%	0.24
Months 13-24	13	17	0.55 (2.7)	4.3%	0.84
Cumulative (months 1-24)	14	20	-1.2 (2.0)	-8.1%	0.54
Costs for physical health-related ED visits PBPM[a]					
Baseline year	35	41			
Months 1-12	31	37	0.79 (2.9)	2.6%	0.79
Months 13-24	23	28	0.73 (3.3)	3.1%	0.83
Cumulative (months 1-24)	28	34	1.0 (2.7)	3.7%	0.71
Medicaid costs for ambulatory visits					
Costs for all-cause ambulatory visits PBPM					
Baseline year	155	177			
Months 1-12	481	342	160 (18)***	50%	<0.01
Months 13-24	245	252	15 (19)	6.2%	0.45
Cumulative (months 1-24)	402	315	109 (16)***	38%	<0.01
Costs for behavioral health-related ambulatory visits PBPM[a]					
Baseline year	89	106			
Months 1-12	403	252	168 (16)***	72%	<0.01
Months 13-24	190	179	28 (16)	17%	0.08
Cumulative (months 1-24)	332	230	119 (13)***	57%	<0.01
Costs for physical health-related ambulatory visits PBPM[a]					
Baseline year	66	71			
Months 1-12	78	90	-7.2 (7.7)	-8.5%	0.35
Months 13-24	55	73	-13 (10.0)	-18%	0.19
Cumulative (months 1-24)	70	85	-10 (7.0)	-13%	0.14

Source: Mathematica analyses of Nevada TAF data, 2017 - 2021.

Notes: The full analysis population included all beneficiaries who had a first visit to a CCBHC (treatment group) or other behavioral health clinic (comparison group) between the start date of the demonstration, July 1, 2017, and December 31, 2020. We

defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date. Nevada used both fee-for-service and managed care arrangements during our study period. In descriptive analyses, we found the payment data on managed care encounter records looked usable from 2017 onwards. For this reason, we implemented cost analyses only among treatment and comparison beneficiaries with a first visit on or after January 1, 2018 (so that we have a full year of baseline cost data for beneficiaries with a first visit in 2018). Further, we found that those treatment and comparison beneficiaries who were enrolled in managed care plans in any year were enrolled across multiple plans.

[a] We identified stays and visit as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health related. For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

CCBHC = certified community behavioral health clinic; ED = emergency department; PBPM = per beneficiary per month; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.5. Impacts on Medicaid costs among the full analysis population: Oklahoma

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Total Medicaid costs					
Total costs per beneficiary per month (PBPM)					
Baseline year	743	737			
Months 1-12	1,174	882	287 (19)***	32%	<0.01
Months 13-24	889	795	88 (24)***	11%	<0.01
Cumulative (months 1-24)	1,063	850	208 (18)***	24%	<0.01
Total behavioral health-related costs PBPM[a]					
Baseline year	334	300			
Months 1-12	708	405	270 (14)***	61%	<0.01
Months 13-24	433	307	92 (18)***	25%	<0.01
Cumulative (months 1-24)	603	370	199 (13)***	49%	<0.01
Total physical health-related costs PBPM[a]					
Baseline year	241	287			
Months 1-12	274	309	12 (8.4)	4.5%	0.16
Months 13-24	263	309	0.79 (12)	<1%	0.95
Cumulative (months 1-24)	268	307	7.3 (8.0)	2.8%	0.36
Medicaid costs for inpatient hospitalizations					
Costs for all-cause hospitalizations PBPM					
Baseline year	159	152			
Months 1-12	160	153	0.48 (13)	<1%	0.97
Months 13-24	131	128	-3.6 (14)	-2.9%	0.79
Cumulative (months 1-24)	148	143	-1.8 (11)	-1.3%	0.86
Costs for behavioral health-related hospitalizations PBPM[a]					
Baseline year	139	129			
Months 1-12	139	124	6.0 (11)	4.5%	0.58
Months 13-24	102	93	-0.38 (12)	<1%	0.97
Cumulative (months 1-24)	124	112	2.5 (9.4)	2.1%	0.79
Costs for physical health-related hospitalizations PBPM[a]					
Baseline year	20	23			
Months 1-12	21	30	-5.6 (5.5)	-21%	0.31
Months 13-24	30	36	-3.3 (7.7)	-11%	0.67
Cumulative (months 1-24)	24	31	-4.3 (4.9)	-16%	0.38
Medicaid costs for ED visits					
Costs for all-cause ED visits PBPM					
Baseline year	44	46			
Months 1-12	44	45	0.82 (1.5)	2.0%	0.58
Months 13-24	41	45	-0.95 (2.0)	-2.4%	0.63

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Cumulative (months 1-24)	43	45	0.06 (1.4)	<1%	0.97
Costs for behavioral health-related ED visits PBPM[a]					
Baseline year	9.7	9.2			
Months 1-12	9.7	9.0	0.19 (0.59)	2.0%	0.75
Months 13-24	9.6	8.6	0.53 (0.69)	6.7%	0.44
Cumulative (months 1-24)	9.6	8.8	0.28 (0.53)	3.2%	0.60
Costs for physical health-related ED visits PBPMa					
Baseline year	34	37			
Months 1-12	34	36	0.63 (1.3)	1.9%	0.63
Months 13-24	32	36	-1.5 (1.7)	-4.7%	0.39
Cumulative (months 1-24)	33	36	-0.22 (1.2)	<1%	0.85
Medicaid costs for ambulatory visits					
Costs for all-cause ambulatory visits PBPM					
Baseline year	240	216			
Months 1-12	646	339	283 (6.2)***	78%	<0.01
Months 13-24	373	252	97 (7.2)***	32%	<0.01
Cumulative (months 1-24)	541	307	210 (5.8)***	63%	<0.01
Costs for behavioral health-related ambulatory visits PBPM[a]					
Baseline year	159	128			
Months 1-12	536	238	267 (5.5)***	100%	<0.01
Months 13-24	294	167	96 (6.1)***	42%	<0.01
Cumulative (months 1-24)	444	212	201 (5.1)***	81%	<0.01
Costs for physical health-related ambulatory visits PBPM[a]					
Baseline year	81	88			
Months 1-12	109	101	15 (2.8)***	16%	<0.01
Months 13-24	79	85	0.87 (3.6)	1.1%	0.81
Cumulative (months 1-24)	97	95	9.0 (2.6)***	10%	<0.01

Source: Mathematica analyses of Nevada TAF data, 2017 - 2021.

Notes: The full analysis population included all beneficiaries who had a first visit to a CCBHC (treatment group) or other behavioral health clinic (comparison group) between the start date of the demonstration, July 1, 2017, and December 31, 2020. We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date. Nevada used both fee-for-service and managed care arrangements during our study period. In descriptive analyses, we found the payment data on managed care encounter records looked usable from 2017 onwards. For this reason, we implemented cost analyses only among treatment and comparison beneficiaries with a first visit on or after January 1, 2018 (so that we have a full year of baseline cost data for beneficiaries with a first visit in 2018). Further, we found that those treatment and comparison beneficiaries who were enrolled in managed care plans in any year were enrolled across multiple plans.

[a] We identified stays and visit as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health related. For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

CCBHC = certified community behavioral health clinic; ED = emergency department; PBPM = per beneficiary per month; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.6. Impacts on quality measures among the full analysis population: Minnesota

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	p-value
Follow-up After Hospitalization for Mental Illness (FUH-AD and FUH-CH)					
7-day					
Baseline year	39	39			
Months 1-12	44	45	-1.2 (2.6)	-2.7%	0.65
Months 13-24	43	43	0.08 (3.1)	<1%	0.98
Cumulative (months 1-24)	43	44	-0.82 (2.4)	-1.9%	0.73
30-day					
Baseline year	68	66			
Months 1-12	70	73	-4.5 (2.5)	-6.0%	0.08
Months 13-24	70	70	-0.83 (2.9)	-1.2%	0.78
Cumulative (months 1-24)	70	72	-3.2 (2.2)	-4.4%	0.15
Follow-up After Emergency Department Visit for Mental Illness (FUM-AD and FUA-CH)					
7-day					
Baseline year	51	53			
Months 1-12	65	63	3.7 (2.8)	6.1%	0.18
Months 13-24	55	55	1.7 (3.4)	3.2%	0.62
Cumulative (months 1-24)	61	61	2.3 (2.6)	3.9%	0.37
30-day					
Baseline year	67	68			
Months 1-12	77	77	0.57 (2.6)	<1%	0.82
Months 13-24	72	73	1.2 (3.2)	1.7%	0.70
Cumulative (months 1-24)	75	76	0.31 (2.4)	<1%	0.90
Follow-up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (FUA-AD and FUA-CH)					
7-day					
Baseline year	34	35			
Months 1-12	41	39	3.3 (3.2)	8.6%	0.31
Months 13-24	38	42	-2.9 (3.6)	-7.1%	0.42
Cumulative (months 1-24)	40	40	0.86 (2.8)	2.2%	0.76
30-day					
Baseline year	50	51			
Months 1-12	58	54	5.2 (3.3)	9.9%	0.11
Months 13-24	53	57	-2.3 (3.7)	-4.1%	0.54
Cumulative (months 1-24)	56	55	2.3 (2.9)	4.2%	0.44
Adherence to Antipsychotic Medications for Individuals with Schizophrenia (SAA)					
Baseline year	62	64			
Months 1-12	59	61	-1.5 (2.9)	-2.4%	0.62

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	p-value
Months 13-24	66	63	4.6 (3.3)	7.5%	0.16
Cumulative (months 1-24)	62	62	1.9 (2.7)	3.2%	0.47
Antidepressant Medication Management (AMM)[a]					
Acute phase	43	44	-0.48 (1.9)	-1.1%	0.79
Continuation phase	25	26	-0.79 (1.6)	-3.1%	0.63

Source: Mathematica analyses of Minnesota TAF data, 2016 – 2021.

Note: The full analysis population included all beneficiaries who had a first visit to a CCBHC (treatment group) or other behavioral health clinic (comparison group) between the start date of the demonstration, July 1, 2017, and December 31, 2020. We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

a We were unable to calculate the measure annually; the measure's long window to identify beneficiaries eligible for inclusion in the measure required lookback into the prior year and the look-forward potentially extended into the next year, making it impossible to report on an annual basis. For this reason, we calculated the measure once for the demonstration period, with the intake period set as the first year starting on the demonstration enrollment date for each beneficiary who qualified for the measure.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

AD = adult; CH = child; ED = emergency department; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.7. Impacts on quality measures among the full analysis population: Nevada

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Follow-up After Hospitalization for Mental Illness (FUH-AD and FUH-CH)					
7-day					
Baseline year	31	36			
Months 1-12	29	41	-6.8 (7.3)	-19%	0.35
Months 13-24	38	39	4.0 (9.7)	12%	0.68
Cumulative (months 1-24)	32	41	-3.5 (7.2)	-10.0%	0.63
30-day					
Baseline year	49	52			
Months 1-12	47	61	-11 (7.7)	-19%	0.16
Months 13-24	61	60	3.6 (10.0)	6.4%	0.72
Cumulative (months 1-24)	52	61	-6.8 (7.5)	-12%	0.36
Follow-up After Emergency Department Visit for Mental Illness (FUM-AD and FUA-CH)					
7-day					
Baseline year	38	51			
Months 1-12	58	64	8.7 (9.8)	18%	0.38
Months 13-24	45	39	20 (15)	82%	0.17
Cumulative (months 1-24)	53	59	7.6 (9.2)	17%	0.40
30-day					
Baseline year	45	58			
Months 1-12	64	74	4.9 (9.9)	8.1%	0.62
Months 13-24	55	52	17 (15)	45%	0.24
Cumulative (months 1-24)	61	69	4.9 (9.7)	8.7%	0.61
Follow-up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (FUA-AD and FUA-CH)					
7-day					
Baseline year	21	13			
Months 1-12	33	31	-6.1 (6.6)	-16%	0.36
Months 13-24	28	25	-5.2 (8.4)	-15%	0.54
Cumulative (months 1-24)	31	29	-5.4 (6.1)	-15%	0.38
30-day					
Baseline year	26	20			
Months 1-12	41	37	-3.2 (7.9)	-7.1%	0.69
Months 13-24	36	34	-5.1 (9.5)	-13%	0.59
Cumulative (months 1-24)	40	36	-2.8 (7.6)	-6.6%	0.71
Adherence to Antipsychotic Medications for Individuals with Schizophrenia (SAA)					
Baseline year	47	36			
Months 1-12	36	37	-12 (12)	-25%	0.34

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	43	46	-13 (14)	-23%	0.33
Cumulative (months 1-24)	39	40	-13 (11)	-25%	0.25
Antidepressant Medication Management (AMM)[a]					
Acute phase	55	50	4.7 (5.3)	9.5%	0.38
Continuation phase	28	28	-0.26 (4.6)	<1%	0.96

Source: Mathematica analyses of Nevada TAF data, 2015 – 2021.

Note: The full analysis population included all beneficiaries who had a first visit to a CCBHC (treatment group) or other behavioral health clinic (comparison group) between the start date of the demonstration, July 1, 2017, and December 31, 2020. We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] We were unable to calculate the measure annually; the measure's long window to identify beneficiaries eligible for inclusion in the measure required lookback into the prior year and the look-forward potentially extended into the next year, making it impossible to report on an annual basis. For this reason, we calculated the measure once for the demonstration period, with the intake period set as the first year starting on the demonstration enrollment date for each beneficiary who qualified for the measure.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

AD = adult; CH = child; ED = emergency department; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.8. Impacts on quality measures among the full analysis population: Oklahoma

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	p-value
Adherence to Antipsychotic Medications for Individuals with Schizophrenia (SAA)					
Baseline year	65	63			
Months 1-12	57	54	3.3 (3.8)	6.2%	0.39
Months 13-24	60	63	-3.4 (4.5)	-5.4%	0.45
Cumulative (months 1-24)	58	58	-0.33 (3.6)	<1%	0.93
Antidepressant Medication Management (AMM)[a]					
Acute phase	42	35	6.4 (2.8)*	18%	0.02
Continuation phase	21	16	4.8 (2.3)*	29%	0.03

Source: Mathematica analyses of Oklahoma TAF data, 2015 – 2021.

Note: The full analysis population included all beneficiaries who had a first visit to a CCBHC (treatment group) or other behavioral health clinic (comparison group) between the start date of the demonstration, April 1, 2017, and December 31, 2020. We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] We were unable to calculate the measure annually; the measure's long window to identify beneficiaries eligible for inclusion in the measure required lookback into the prior year and the look-forward potentially extended into the next year, making it impossible to report on an annual basis. For this reason, we calculated the measure once for the demonstration period, with the intake period set as the first year starting on the demonstration enrollment date for each beneficiary who qualified for the measure.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

TAF = T-MSIS analytic files

Appendix Exhibit A.VII.9. Impacts on hospitalizations by subgroup: Minnesota

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
All-cause hospitalizations per 1,000 beneficiaries per year					
Children and adolescents[a]					
Baseline year	76	90			
Months 1-12	88	97	5.6 (8.5)	6.8%	0.51
Months 13-24	81	81	15 (9.0)	24%	0.09
Cumulative (months 1-24)	84	89	9.7 (7.6)	13%	0.20
Adults[a]					
Baseline year	451	454			
Months 1-12	379	384	-2.9 (17)	<1%	0.86
Months 13-24	365	337	31 (20)	9.5%	0.12
Cumulative (months 1-24)	372	365	9.3 (16)	2.6%	0.55
Beneficiaries with SUD[b]					
Baseline year	704	715			
Months 1-12	533	557	-12 (29)	-2.2%	0.68
Months 13-24	513	482	43 (35)	9.6%	0.21
Cumulative (months 1-24)	524	526	9.3 (28)	1.8%	0.74
Beneficiaries with a first visit in DY1[c]					
Baseline year	290	286			
Months 1-12	278	254	21 (15)	8.3%	0.16
Months 13-24	264	232	28 (16)	13%	0.08
Cumulative (months 1-24)	270	243	23 (13)	9.6%	0.09
Beneficiaries with a first visit in DY2[c]					
Baseline year	319	354			
Months 1-12	257	331	-40 (22)	-13%	0.08
Months 13-24	224	233	25 (24)	13%	0.30
Cumulative (months 1-24)	240	285	-10 (20)	-4.2%	0.61
Beneficiaries with a first visit in DY3[c]					
Baseline year	331	344			
Months 1-12	268	287	-5.6 (27)	-2.0%	0.83
Months 13-24	247	255	4.4 (35)	1.9%	0.90
Cumulative (months 1-24)	261	275	-1.4 (25)	<1%	0.96
Beneficiaries with a first visit in DY4[c]					
Baseline year	361	341			
Months 1-12	240	241	-22 (44)	-8.0%	0.62
Behavioral health-related hospitalizations per 1,000 beneficiaries per year[d]					
Children and adolescents[a]					
Baseline year	63	77			
Months 1-12	79	84	9.0 (8.0)	13%	0.26

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	69	67	17 (8.2)*	35%	0.04
Cumulative (months 1-24)	74	76	12 (7.0)	20%	0.08
Adults[a]					
Baseline year	417	415			
Months 1-12	349	351	-4.1 (16)	-1.2%	0.80
Months 13-24	333	303	28 (19)	9.4%	0.14
Cumulative (months 1-24)	341	332	7.5 (15)	2.3%	0.62
Beneficiaries with SUD[b]					
Baseline year	678	688			
Months 1-12	509	529	-11 (29)	-2.1%	0.71
Months 13-24	485	455	40 (34)	9.3%	0.24
Cumulative (months 1-24)	499	498	9.3 (27)	1.9%	0.73
Beneficiaries with a first visit in DY1[c]					
Baseline year	265	260			
Months 1-12	256	228	23 (14)	10%	0.10
Months 13-24	240	207	28 (15)	14%	0.07
Cumulative (months 1-24)	247	218	24 (13)	11%	0.06
Beneficiaries with a first visit in DY2[c]					
Baseline year	291	326			
Months 1-12	234	306	-38 (21)	-14%	0.08
Months 13-24	200	209	25 (23)	15%	0.27
Cumulative (months 1-24)	217	261	-10 (19)	-4.5%	0.60
Beneficiaries with a first visit in DY3[c]					
Baseline year	302	311			
Months 1-12	246	263	-8.5 (26)	-3.3%	0.74
Months 13-24	223	232	-0.61 (33)	<1%	0.99
Cumulative (months 1-24)	238	252	-5.1 (25)	-2.1%	0.83
Beneficiaries with a first visit in DY4[c]					
Baseline year	334	301			
Months 1-12	221	216	-28 (42)	-11%	0.51
Physical health-related hospitalizations per 1,000 beneficiaries per year[d]					
Children and adolescents[a]					
Baseline year	12	13			
Months 1-12	8.9	13	-3.3 (2.9)	-26%	0.25
Months 13-24	12	15	-1.7 (3.6)	-12%	0.64
Cumulative (months 1-24)	10	14	-2.6 (2.8)	-20%	0.36
Adults[a]					
Baseline year	35	38			
Months 1-12	30	33	1.2 (4.1)	4.0%	0.78

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	32	33	3.1 (4.6)	11%	0.50
Cumulative (months 1-24)	31	33	1.7 (3.7)	6.0%	0.64
Beneficiaries with SUD[b]					
Baseline year	25	28			
Months 1-12	24	28	-1.4 (5.5)	-5.9%	0.79
Months 13-24	28	27	3.2 (6.0)	15%	0.60
Cumulative (months 1-24)	25	28	0.02 (5.0)	<1%	1.00
Beneficiaries with a first visit in DY1[c]					
Baseline year	24	26			
Months 1-12	22	26	-2.1 (3.8)	-8.7%	0.58
Months 13-24	24	25	0.72 (4.0)	3.2%	0.86
Cumulative (months 1-24)	22	26	-1.1 (3.4)	-4.7%	0.74
Beneficiaries with a first visit in DY2[c]					
Baseline year	28	28			
Months 1-12	24	25	-1.4 (5.8)	-5.5%	0.81
Months 13-24	24	24	-0.55 (6.0)	-2.5%	0.93
Cumulative (months 1-24)	24	24	-0.23 (5.3)	<1%	0.97
Beneficiaries with a first visit in DY3[c]					
Baseline year	29	33			
Months 1-12	23	24	2.9 (6.5)	15%	0.66
Months 13-24	24	23	5.0 (10)	25%	0.63
Cumulative (months 1-24)	23	24	3.8 (6.7)	19%	0.57
Beneficiaries with a first visit in DY4[c]					
Baseline year	28	39			
Months 1-12	19	24	6.3 (10)	47%	0.54
Percentage with any hospitalization					
Children and adolescents[a]					
Baseline year	5.7	6.3			
Months 1-12	6.0	6.8	-0.10 (0.53)	-1.7%	0.84
Months 13-24	5.7	5.4	0.92 (0.56)	19%	0.10
Cumulative (months 1-24)	9.9	11	-0.46 (0.62)	-4.5%	0.45
Adults[a]					
Baseline year	25	25			
Months 1-12	22	21	0.50 (0.73)	2.3%	0.49
Months 13-24	21	19	1.3 (0.81)	6.8%	0.10
Cumulative (months 1-24)	34	32	1.4 (0.79)	4.4%	0.07
Beneficiaries with SUD[b]					
Baseline year	36	35			
Months 1-12	28	28	-0.15 (1.1)	<1%	0.90

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	26	25	0.71 (1.3)	2.8%	0.57
Cumulative (months 1-24)	41	41	0.16 (1.2)	<1%	0.89
Beneficiaries with a first visit in DY1[c]					
Baseline year	17	17			
Months 1-12	16	15	0.73 (0.67)	4.8%	0.28
Months 13-24	15	14	1.1 (0.71)	8.0%	0.12
Cumulative (months 1-24)	25	24	1.3 (0.74)	5.7%	0.07
Beneficiaries with a first visit in DY2[c]					
Baseline year	18	18			
Months 1-12	16	18	-1.7 (1.0)	-9.8%	0.09
Months 13-24	14	12	1.3 (1.0)	10%	0.22
Cumulative (months 1-24)	24	25	-0.89 (1.1)	-3.5%	0.42
Beneficiaries with a first visit in DY3[c]					
Baseline year	19	18			
Months 1-12	16	16	0.17 (1.3)	1.1%	0.90
Months 13-24	14	13	1.1 (1.5)	8.5%	0.47
Cumulative (months 1-24)	25	24	-0.20 (1.4)	<1%	0.89
Beneficiaries with a first visit in DY4[c]					
Baseline year	18	18			
Months 1-12	16	14	2.6 (1.8)	19%	0.15

Source: Mathematica analyses of Minnesota TAF data, 2016 – 2021.

Note: We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] We defined the children/adolescents and adult subgroups based on age at the first visit date. We categorized beneficiaries as children/adolescents if they were under the age of 19 and adults if they were age 19 or older.

[b] We identified the presence of SUD based on relevant diagnosis codes in the 18 months before enrollment, the maximum amount of baseline TAF data available for beneficiaries with enrollment dates at the start of the demonstration, and in the 30 days following the first visit date (to identify beneficiaries newly seeking care for SUD).

[c] The CCBHC demonstration started in Minnesota on July 1, 2017. Demonstration year 1 spans July 1, 2017 to June 30, 2018; demonstration year 2 spans July 1, 2018 to June 30, 2019; demonstration year 3 spans July 1, 2019 to June 30, 2020; demonstration year 4 spans July 1, 2020 to June 30, 2021, but the demonstration year 4 cohort includes only those beneficiaries with a first visit date between July 1, 2020 and December 31, 2020, due to data availability. We also only have a maximum of one year of follow-up data for beneficiaries in cohort 4 because TAF data were only available through December 31, 2021.

[d] We identified stays and visits as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health relat[ed.] For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

DY = demonstration year; SUD = substance use disorder; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.10. Impacts on emergency department visits by subgroup: Minnesota

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
All-cause ED visits per 1,000 beneficiaries per year					
Children and adolescents[a]					
Baseline year	713	779			
Months 1-12	735	723	78 (26)**	12%	<0.01
Months 13-24	660	670	57 (30)	9.6%	0.06
Cumulative (months 1-24)	700	698	69 (24)**	11%	<0.01
Adults[a]					
Baseline year	2,402	2,328			
Months 1-12	2,138	2,023	41 (52)	2.0%	0.43
Months 13-24	2,002	1,736	191 (70)**	10%	<0.01
Cumulative (months 1-24)	2,078	1,902	102 (53)	5.1%	0.05
Beneficiaries with SUD[b]					
Baseline year	3,265	3,182			
Months 1-12	2,777	2,667	27 (88)	<1%	0.76
Months 13-24	2,651	2,263	305 (125)*	13%	0.01
Cumulative (months 1-24)	2,722	2,497	142 (92)	5.5%	0.12
Beneficiaries with a first visit in DY1[c]					
Baseline year	1,755	1,642			
Months 1-12	1,585	1,446	27 (43)	1.7%	0.53
Months 13-24	1,536	1,346	78 (52)	5.3%	0.13
Cumulative (months 1-24)	1,561	1,402	46 (42)	3.1%	0.27
Beneficiaries with a first visit in DY2[c]					
Baseline year	1,732	1,969			
Months 1-12	1,679	1,831	85 (74)	5.3%	0.25
Months 13-24	1,287	1,347	176 (102)	16%	0.08
Cumulative (months 1-24)	1,488	1,591	133 (82)	9.8%	0.10
Beneficiaries with a first visit in DY3[c]					
Baseline year	1,847	1,778			
Months 1-12	1,640	1,477	93 (90)	6.0%	0.30
Months 13-24	1,714	1,307	338 (134)*	27%	0.01
Cumulative (months 1-24)	1,653	1,414	170 (89)	12%	0.06
Beneficiaries with a first visit in DY4[c]					
Baseline year	1,676	1,602			
Months 1-12	1,470	1,310	87 (122)	6.1%	0.48
Behavioral health-related ED visits per 1,000 beneficiaries per year[d]					
Children and adolescents[a]					
Baseline year	127	144			
Months 1-12	177	160	34 (12)**	23%	<0.01

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	152	132	37 (14)**	32%	<0.01
Cumulative (months 1-24)	164	147	34 (11)**	25%	<0.01
Adults[a]					
Baseline year	1,012	950			
Months 1-12	869	808	-0.57 (32)	<1%	0.99
Months 13-24	781	632	88 (43)*	12%	0.04
Cumulative (months 1-24)	830	735	33 (31)	4.1%	0.29
Beneficiaries with SUD[b]					
Baseline year	1,656	1,541			
Months 1-12	1,342	1,272	-46 (58)	-3.3%	0.43
Months 13-24	1,238	1,000	123 (80)	11%	0.12
Cumulative (months 1-24)	1,296	1,161	20 (58)	1.5%	0.73
Beneficiaries with a first visit in DY1[c]					
Baseline year	680	562			
Months 1-12	597	476	3.2 (26)	<1%	0.90
Months 13-24	552	404	30 (31)	5.8%	0.34
Cumulative (months 1-24)	575	445	13 (25)	2.2%	0.62
Beneficiaries with a first visit in DY2[c]					
Baseline year	644	810			
Months 1-12	638	770	34 (41)	5.6%	0.41
Months 13-24	495	508	153 (57)**	45%	<0.01
Cumulative (months 1-24)	568	644	90 (42)*	19%	0.03
Beneficiaries with a first visit in DY3[c]					
Baseline year	709	679			
Months 1-12	605	592	-17 (57)	-2.7%	0.77
Months 13-24	627	550	48 (86)	8.8%	0.58
Cumulative (months 1-24)	606	577	-0.75 (57)	<1%	0.99
Beneficiaries with a first visit in DY4[c]					
Baseline year	655	619			
Months 1-12	580	471	74 (72)	14%	0.31
Physical health-related ED visits per 1,000 beneficiaries per year[d]					
Children and adolescents[a]					
Baseline year	585	636			
Months 1-12	558	564	45 (22)*	8.7%	0.04
Months 13-24	508	538	20 (25)	4.2%	0.42
Cumulative (months 1-24)	536	551	35 (20)	7.0%	0.08
Adults[a]					
Baseline year	1,390	1,377			
Months 1-12	1,269	1,215	42 (35)	3.4%	0.24

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	1,221	1,105	103 (45)*	9.3%	0.02
Cumulative (months 1-24)	1,248	1,166	69 (35)	5.8%	0.05
Beneficiaries with SUD[b]					
Baseline year	1,609	1,641			
Months 1-12	1,435	1,395	72 (56)	5.3%	0.20
Months 13-24	1,413	1,263	182 (75)*	15%	0.02
Cumulative (months 1-24)	1,426	1,335	123 (58)*	9.4%	0.03
Beneficiaries with a first visit in DY1[c]					
Baseline year	1,074	1,080			
Months 1-12	988	970	24 (30)	2.5%	0.42
Months 13-24	984	942	48 (35)	5.1%	0.17
Cumulative (months 1-24)	986	958	34 (28)	3.5%	0.23
Beneficiaries with a first visit in DY2[c]					
Baseline year	1,088	1,158			
Months 1-12	1,041	1,061	51 (56)	5.2%	0.36
Months 13-24	792	839	23 (67)	3.0%	0.73
Cumulative (months 1-24)	919	947	43 (59)	4.9%	0.47
Beneficiaries with a first visit in DY3[c]					
Baseline year	1,138	1,098			
Months 1-12	1,035	885	110 (61)	12%	0.07
Months 13-24	1,087	757	290 (82)***	42%	<0.01
Cumulative (months 1-24)	1,048	837	171 (58)**	20%	<0.01
Beneficiaries with a first visit in DY4[c]					
Baseline year	1,021	983			
Months 1-12	890	839	13 (84)	1.5%	0.88
Percentage with any ED visit					
Children and adolescents[a]					
Baseline year	38	41			
Months 1-12	38	37	3.0 (1.0)**	8.7%	<0.01
Months 13-24	33	35	0.86 (1.1)	2.7%	0.45
Cumulative (months 1-24)	52	54	1.3 (1.1)	2.6%	0.22
Adults[a]					
Baseline year	64	63			
Months 1-12	60	57	1.9 (0.79)*	3.3%	0.02
Months 13-24	55	53	1.2 (0.91)	2.2%	0.18
Cumulative (months 1-24)	74	71	1.8 (0.75)*	2.5%	0.02
Beneficiaries with SUD[b]					
Baseline year	74	73			
Months 1-12	67	65	1.6 (1.1)	2.4%	0.14

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	62	60	1.4 (1.3)	2.4%	0.25
Cumulative (months 1-24)	81	79	1.9 (0.98)	2.4%	0.06
Beneficiaries with a first visit in DY1[c]					
Baseline year	54	55			
Months 1-12	51	50	2.4 (0.87)**	4.9%	<0.01
Months 13-24	48	48	0.90 (0.92)	1.9%	0.33
Cumulative (months 1-24)	66	65	1.2 (0.85)	1.9%	0.14
Beneficiaries with a first visit in DY2[c]					
Baseline year	54	55			
Months 1-12	53	53	0.50 (1.3)	<1%	0.70
Months 13-24	43	43	0.20 (1.4)	<1%	0.89
Cumulative (months 1-24)	65	65	0.78 (1.2)	1.2%	0.53
Beneficiaries with a first visit in DY3[c]					
Baseline year	56	56			
Months 1-12	52	46	5.6 (1.6)***	12%	<0.01
Months 13-24	45	41	4.3 (2.0)*	11%	0.04
Cumulative (months 1-24)	66	61	5.1 (1.6)**	8.3%	<0.01
Beneficiaries with a first visit in DY4[c]					
Baseline year	53	53			
Months 1-12	47	46	0.15 (2.3)	<1%	0.95

Source: Mathematica analyses of Minnesota TAF data, 2016 – 2021.

Note: We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] We defined the children/adolescents and adult subgroups based on age at the first visit date. We categorized beneficiaries as children/adolescents if they were under the age of 19 and adults if they were age 19 or older.

[b] We identified the presence of SUD based on relevant diagnosis codes in the 18 months before enrollment, the maximum amount of baseline TAF data available for beneficiaries with enrollment dates at the start of the demonstration, and in the 30 days following the first visit date (to identify beneficiaries newly seeking care for SUD).

[c] The CCBHC demonstration started in Minnesota on July 1, 2017. Demonstration year 1 spans July 1, 2017 to June 30, 2018; demonstration year 2 spans July 1, 2018 to June 30, 2019; demonstration year 3 spans July 1, 2019 to June 30, 2020; demonstration year 4 spans July 1, 2020 to June 30, 2021, but the demonstration year 4 cohort includes only those beneficiaries with a first visit date between July 1, 2020 and December 31, 2020, due to data availability. We also only have a maximum of one year of follow-up data for beneficiaries in cohort 4 because TAF data were only available through December 31, 2021.

[d] We identified stays and visit as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health related. For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

DY = demonstration year; ED = emergency department; SUD = substance use disorder; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.11. Impacts on ambulatory visits by subgroup: Minnesota

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
All-cause ambulatory visits per 1,000 beneficiaries per year					
Children and adolescents[a]					
Baseline year	30,955	31,407			
Months 1-12	46,525	45,359	1,619 (688)*	3.6%	0.02
Months 13-24	34,117	34,374	196 (879)	<1%	0.82
Cumulative (months 1-24)	41,179	40,715	916 (689)	2.2%	0.18
Adults[a]					
Baseline year	31,755	32,213			
Months 1-12	45,408	46,034	-168 (534)	<1%	0.75
Months 13-24	39,213	39,144	527 (749)	1.3%	0.48
Cumulative (months 1-24)	42,883	43,229	111 (550)	<1%	0.84
Beneficiaries with SUD[b]					
Baseline year	34,328	34,255			
Months 1-12	49,886	49,686	128 (876)	<1%	0.88
Months 13-24	38,684	39,961	-1,350 (1,148)	-3.3%	0.24
Cumulative (months 1-24)	45,351	45,780	-502 (869)	-1.1%	0.56
Beneficiaries with a first visit in DY1[c]					
Baseline year	37,269	36,225			
Months 1-12	48,499	47,694	-239 (578)	<1%	0.68
Months 13-24	40,909	40,285	-420 (767)	<1%	0.58
Cumulative (months 1-24)	45,096	44,536	-484 (598)	-1.1%	0.42
Beneficiaries with a first visit in DY2[c]					
Baseline year	24,899	28,332			
Months 1-12	43,475	43,334	3,573 (882)***	8.9%	<0.01
Months 13-24	33,815	34,816	2,431 (1,065)*	7.6%	0.02
Cumulative (months 1-24)	39,021	39,498	2,955 (867)***	8.1%	<0.01
Beneficiaries with a first visit in DY3[c]					
Baseline year	25,260	25,429			
Months 1-12	41,282	42,439	-988 (1,022)	-2.3%	0.33
Months 13-24	35,795	34,846	1,118 (1,545)	3.2%	0.47
Cumulative (months 1-24)	39,729	40,049	-151 (1,026)	<1%	0.88
Beneficiaries with a first visit in DY4[c]					
Baseline year	22,026	24,781			
Months 1-12	42,398	44,701	452 (1,558)	1.1%	0.77
Behavioral health-related ambulatory visits per 1,000 beneficiaries per year[d]					
Children and adolescents[a]					
Baseline year	19,625	18,935			
Months 1-12	34,560	30,501	3,369 (603)***	11%	<0.01

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	23,747	21,494	1,563 (752)*	6.6%	0.04
Cumulative (months 1-24)	29,895	26,668	2,538 (598)***	9.1%	<0.01
Adults[a]					
Baseline year	21,324	21,719			
Months 1-12	32,989	33,390	-6.8 (471)	<1%	0.99
Months 13-24	26,996	26,453	938 (649)	3.4%	0.15
Cumulative (months 1-24)	30,559	30,570	385 (481)	1.2%	0.42
Beneficiaries with SUD[b]					
Baseline year	25,937	25,870			
Months 1-12	39,769	39,356	346 (798)	<1%	0.66
Months 13-24	29,461	29,997	-603 (1,036)	-1.9%	0.56
Cumulative (months 1-24)	35,614	35,594	-47 (790)	<1%	0.95
Beneficiaries with a first visit in DY1[c]					
Baseline year	25,356	23,962			
Months 1-12	35,183	33,067	723 (511)	2.1%	0.16
Months 13-24	28,279	26,379	506 (665)	1.8%	0.45
Cumulative (months 1-24)	32,089	30,214	481 (523)	1.5%	0.36
Beneficiaries with a first visit in DY2[c]					
Baseline year	14,937	17,978			
Months 1-12	31,649	30,714	3,976 (764)***	14%	<0.01
Months 13-24	23,756	23,819	2,978 (904)***	14%	<0.01
Cumulative (months 1-24)	28,019	27,577	3,483 (742)***	14%	<0.01
Beneficiaries with a first visit in DY3[c]					
Baseline year	15,665	15,542			
Months 1-12	31,306	31,039	143 (907)	<1%	0.87
Months 13-24	24,854	23,100	1,631 (1,305)	6.9%	0.21
Cumulative (months 1-24)	29,507	28,579	805 (899)	2.8%	0.37
Beneficiaries with a first visit in DY4[c]					
Baseline year	14,580	15,319			
Months 1-12	31,919	32,486	172 (1,358)	<1%	0.90
Physical health-related ambulatory visits per 1,000 beneficiaries per year[d]					
Children and adolescents[a]					
Baseline year	11,330	12,471			
Months 1-12	11,966	14,858	-1,751 (331)***	-13%	<0.01
Months 13-24	10,370	12,879	-1,368 (434)**	-11%	<0.01
Cumulative (months 1-24)	11,283	14,047	-1,622 (333)***	-12%	<0.01
Adults[a]					
Baseline year	10,431	10,494			
Months 1-12	12,419	12,644	-162 (228)	-1.3%	0.48

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	12,217	12,692	-411 (345)	-3.2%	0.23
Cumulative (months 1-24)	12,324	12,660	-273 (244)	-2.2%	0.26
Beneficiaries with SUD[b]					
Baseline year	8,391	8,386			
Months 1-12	10,117	10,330	-219 (300)	-2.1%	0.47
Months 13-24	9,223	9,964	-747 (432)	-7.4%	0.08
Cumulative (months 1-24)	9,737	10,186	-455 (307)	-4.5%	0.14
Beneficiaries with a first visit in DY1[c]					
Baseline year	11,913	12,262			
Months 1-12	13,316	14,628	-962 (265)***	-6.8%	<0.01
Months 13-24	12,630	13,905	-926 (364)*	-6.7%	0.01
Cumulative (months 1-24)	13,008	14,322	-965 (279)***	-6.9%	<0.01
Beneficiaries with a first visit in DY2[c]					
Baseline year	9,962	10,354			
Months 1-12	11,826	12,621	-402 (411)	-3.3%	0.33
Months 13-24	10,058	10,997	-547 (514)	-5.2%	0.29
Cumulative (months 1-24)	11,001	11,921	-528 (415)	-4.6%	0.20
Beneficiaries with a first visit in DY3[c]					
Baseline year	9,595	9,887			
Months 1-12	9,976	11,399	-1,131 (423)**	-10%	<0.01
Months 13-24	10,941	11,746	-513 (708)	-4.8%	0.47
Cumulative (months 1-24)	10,222	11,469	-955 (431)*	-8.7%	0.03
Beneficiaries with a first visit in DY4[c]					
Baseline year	7,446	9,463			
Months 1-12	10,479	12,215	280 (652)	2.8%	0.67

Source: Mathematica analyses of Minnesota TAF data, 2016 – 2021.

Note: We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] We defined the children/adolescents and adult subgroups based on age at the first visit date. We categorized beneficiaries as children/adolescents if they were under the age of 19 and adults if they were age 19 or older.

[b] We identified the presence of SUD based on relevant diagnosis codes in the 18 months before enrollment, the maximum amount of baseline TAF data available for beneficiaries with enrollment dates at the start of the demonstration, and in the 30 days following the first visit date (to identify beneficiaries newly seeking care for SUD).

[c] The CCBHC demonstration started in Minnesota on July 1, 2017. Demonstration year 1 spans July 1, 2017 to June 30, 2018; demonstration year 2 spans July 1, 2018 to June 30, 2019; demonstration year 3 spans July 1, 2019 to June 30, 2020; demonstration year 4 spans July 1, 2020 to June 30, 2021, but the demonstration year 4 cohort includes only those beneficiaries with a first visit date between July 1, 2020 and December 31, 2020, due to data availability. We also only have a maximum of one year of follow-up data for beneficiaries in cohort 4 because TAF data were only available through December 31, 2021.

[d] We identified stays and visit as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health related. For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

DY = demonstration year; SUD = substance use disorder; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.12. Impacts on hospitalizations by subgroup: Nevada

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
All-cause hospitalizations per 1,000 beneficiaries per year					
Children and adolescents[a]					
Baseline year	88	151			
Months 1-12	100	174	-11 (32)	-10%	0.73
Months 13-24	79	94	48 (37)	180%	0.19
Cumulative (months 1-24)	93	145	11 (28)	14%	0.69
Adults[a]					
Baseline year	372	423			
Months 1-12	290	465	-124 (42)**	-30%	<0.01
Months 13-24	336	463	-76 (59)	-18%	0.20
Cumulative (months 1-24)	306	461	-104 (41)*	-25%	0.01
Beneficiaries with SUD[b]					
Baseline year	442	542			
Months 1-12	307	547	-140 (53)**	-31%	<0.01
Months 13-24	387	538	-51 (75)	-11%	0.50
Cumulative (months 1-24)	337	542	-104 (52)*	-23%	0.04
Beneficiaries with a first visit in DY1[c]					
Baseline year	352	532			
Months 1-12	294	517	-43 (95)	-13%	0.65
Months 13-24	406	624	-39 (113)	-8.2%	0.73
Cumulative (months 1-24)	345	565	-40 (90)	-10%	0.65
Beneficiaries with a first visit in DY2[c]					
Baseline year	332	301			
Months 1-12	269	391	-152 (70)*	-35%	0.03
Months 13-24	262	335	-104 (88)	-27%	0.24
Cumulative (months 1-24)	262	365	-134 (71)	-32%	0.06
Beneficiaries with a first visit in DY3[c]					
Baseline year	256	306			
Months 1-12	234	352	-68 (41)	-23%	0.09
Months 13-24	200	257	-6.9 (53)	-3.7%	0.90
Cumulative (months 1-24)	224	316	-42 (39)	-16%	0.29
Beneficiaries with a first visit in DY4[c]					
Baseline year	332	332			
Months 1-12	175	358	-183 (84)*	-50%	0.03
Behavioral health-related hospitalizations per 1,000 beneficiaries per year[d]					
Children and adolescents[a]					
Baseline year	76	136			
Months 1-12	85	168	-24 (30)	-22%	0.43

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	72	84	49 (37)	250%	0.19
Cumulative (months 1-24)	81	138	2.6 (27)	3.4%	0.93
Adults[a]					
Baseline year	331	377			
Months 1-12	246	415	-124 (39)**	-33%	<0.01
Months 13-24	299	402	-57 (57)	-16%	0.32
Cumulative (months 1-24)	266	409	-97 (39)*	-26%	0.01
Beneficiaries with SUD[b]					
Baseline year	411	502			
Months 1-12	271	507	-145 (50)**	-34%	<0.01
Months 13-24	358	483	-35 (74)	-8.6%	0.63
Cumulative (months 1-24)	303	498	-104 (51)*	-25%	0.04
Beneficiaries with a first visit in DY1[c]					
Baseline year	325	494			
Months 1-12	268	479	-42 (90)	-13%	0.64
Months 13-24	382	560	-8.5 (111)	-2.0%	0.94
Cumulative (months 1-24)	320	517	-27 (87)	-7.5%	0.75
Beneficiaries with a first visit in DY2[c]					
Baseline year	297	272			
Months 1-12	228	344	-140 (66)*	-37%	0.03
Months 13-24	235	293	-82 (86)	-24%	0.34
Cumulative (months 1-24)	226	321	-118 (68)	-32%	0.08
Beneficiaries with a first visit in DY3[c]					
Baseline year	217	257			
Months 1-12	191	311	-80 (38)*	-29%	0.04
Months 13-24	162	211	-8.1 (49)	-5.1%	0.87
Cumulative (months 1-24)	185	278	-52 (37)	-23%	0.17
Beneficiaries with a first visit in DY4[c]					
Baseline year	306	312			
Months 1-12	146	334	-182 (81)*	-55%	0.03
Physical health-related hospitalizations per 1,000 beneficiaries per year[d]					
Children and adolescents[a]					
Baseline year	12	15			
Months 1-12	15	5.4	13 (8.7)	-1,610%	0.13
Months 13-24	6.5	10	-0.45 (9.4)	-6.1%	0.96
Cumulative (months 1-24)	13	7.2	8.6 (7.5)	525%	0.25
Adults[a]					
Baseline year	41	46			
Months 1-12	44	50	-0.53 (11)	-1.3%	0.96

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	37	61	-19 (15)	-35%	0.20
Cumulative (months 1-24)	40	52	-6.7 (10)	-15%	0.52
Beneficiaries with SUD[b]					
Baseline year	31	40			
Months 1-12	36	40	5.3 (12)	18%	0.67
Months 13-24	30	55	-16 (17)	-33%	0.34
Cumulative (months 1-24)	34	44	-0.64 (11)	-1.9%	0.96
Beneficiaries with a first visit in DY1[c]					
Baseline year	27	37			
Months 1-12	26	37	-1.3 (20)	-4.9%	0.95
Months 13-24	24	64	-30 (24)	-57%	0.20
Cumulative (months 1-24)	25	49	-13 (18)	-35%	0.47
Beneficiaries with a first visit in DY2[c]					
Baseline year	35	29			
Months 1-12	41	47	-12 (22)	-23%	0.59
Months 13-24	27	42	-22 (21)	-46%	0.29
Cumulative (months 1-24)	35	44	-15 (19)	-32%	0.42
Beneficiaries with a first visit in DY3[c]					
Baseline year	39	49			
Months 1-12	43	41	12 (13)	47%	0.35
Months 13-24	38	47	1.2 (17)	4.1%	0.94
Cumulative (months 1-24)	39	39	10 (12)	40%	0.40
Beneficiaries with a first visit in DY4[c]					
Baseline year	25	20			
Months 1-12	29	24	-0.55 (20)	-1.8%	0.98
Percentage with any hospitalization					
Children and adolescents[a]					
Baseline year	6.6	9.5			
Months 1-12	6.7	9.4	0.60 (1.9)	9.7%	0.75
Months 13-24	5.8	5.3	3.7 (2.1)	178%	0.08
Cumulative (months 1-24)	11	14	-0.19 (2.2)	-1.8%	0.93
Adults[a]					
Baseline year	21	20			
Months 1-12	17	21	-3.5 (1.7)*	-17%	0.04
Months 13-24	17	17	-0.61 (2.1)	-3.6%	0.77
Cumulative (months 1-24)	28	31	-3.6 (2.0)	-11%	0.07
Beneficiaries with SUD[b]					
Baseline year	24	25			
Months 1-12	18	24	-4.4 (2.1)*	-20%	0.03

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	18	20	-0.42 (2.7)	-2.3%	0.87
Cumulative (months 1-24)	29	35	-5.1 (2.4)*	-15%	0.03
Beneficiaries with a first visit in DY1[c]					
Baseline year	20	23			
Months 1-12	18	18	1.8 (3.3)	11%	0.59
Months 13-24	19	19	2.4 (4.1)	14%	0.57
Cumulative (months 1-24)	28	30	0.98 (4.0)	3.6%	0.81
Beneficiaries with a first visit in DY2[c]					
Baseline year	20	19			
Months 1-12	17	20	-3.8 (3.3)	-19%	0.24
Months 13-24	13	16	-3.4 (3.3)	-20%	0.32
Cumulative (months 1-24)	25	27	-3.6 (3.5)	-13%	0.30
Beneficiaries with a first visit in DY3[c]					
Baseline year	15	16			
Months 1-12	13	18	-3.5 (1.8)	-21%	0.05
Months 13-24	11	11	1.0 (2.1)	10%	0.63
Cumulative (months 1-24)	21	26	-3.5 (2.1)	-14%	0.09
Beneficiaries with a first visit in DY4[c]					
Baseline year	17	19			
Months 1-12	13	18	-2.7 (3.8)	-17%	0.48

Source: Mathematica analyses of Nevada TAF data, 2015 – 2021.

Note: We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] We defined the children/adolescents and adult subgroups based on age at the first visit date. We categorized beneficiaries as children/adolescents if they were under the age of 19 and adults if they were age 19 or older.

[b] We identified the presence of SUD based on relevant diagnosis codes in the 24 months before enrollment, the maximum amount of baseline TAF data available for beneficiaries with enrollment dates at the start of the demonstration, and in the 30 days following the first visit date (to identify beneficiaries newly seeking care for SUD).

[c] The CCBHC demonstration started in Nevada on July 1, 2017. Demonstration year 1 spans July 1, 2017 to June 30, 2018; demonstration year 2 spans July 1, 2018 to June 30, 2019; demonstration year 3 spans July 1, 2019 to June 30, 2020; demonstration year 4 spans July 1, 2020 to June 30, 2021, but the demonstration year 4 cohort includes only those beneficiaries with a first visit date between July 1, 2020 and December 31, 2020, due to data availability. We also only have a maximum of one year of follow-up data for beneficiaries in cohort 4 because TAF data were only available through December 31, 2021.

[d] We identified stays and visit as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health related. For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

DY = demonstration year; SUD = substance use disorder; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.13. Impacts on emergency department visits by subgroup: Nevada

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
All-cause ED visits per 1,000 beneficiaries per year					
Children and adolescents[a]					
Baseline year	786	797			
Months 1-12	769	668	112 (103)	17%	0.28
Months 13-24	427	626	-188 (123)	-25%	0.13
Cumulative (months 1-24)	655	645	21 (91)	3.2%	0.82
Adults[a]					
Baseline year	2,289	2,357			
Months 1-12	1,912	2,202	-222 (148)	-11%	0.13
Months 13-24	1,563	1,725	-94 (173)	-5.4%	0.59
Cumulative (months 1-24)	1,805	2,031	-159 (135)	-8.1%	0.24
Beneficiaries with SUD[b]					
Baseline year	2,349	2,540			
Months 1-12	1,903	2,406	-312 (190)	-14%	0.10
Months 13-24	1,570	2,005	-244 (217)	-12%	0.26
Cumulative (months 1-24)	1,811	2,254	-252 (173)	-12%	0.14
Beneficiaries with a first visit in DY1[c]					
Baseline year	2,711	2,262			
Months 1-12	2,452	2,169	-166 (266)	-6.4%	0.53
Months 13-24	1,976	2,122	-596 (306)	-23%	0.05
Cumulative (months 1-24)	2,263	2,142	-329 (255)	-13%	0.20
Beneficiaries with a first visit in DY2[c]					
Baseline year	1,912	1,864			
Months 1-12	1,999	1,796	155 (206)	8.2%	0.45
Months 13-24	1,375	1,270	57 (225)	4.3%	0.80
Cumulative (months 1-24)	1,721	1,541	132 (196)	8.2%	0.50
Beneficiaries with a first visit in DY3[c]					
Baseline year	1,554	1,887			
Months 1-12	1,306	1,706	-66 (114)	-4.9%	0.56
Months 13-24	972	1,144	162 (179)	19%	0.37
Cumulative (months 1-24)	1,203	1,525	11 (120)	<1%	0.93
Beneficiaries with a first visit in DY4[c]					
Baseline year	1,933	1,967			
Months 1-12	1,061	1,692	-598 (465)	-36%	0.20
Behavioral health-related ED visits per 1,000 beneficiaries per year[d]					
Children and adolescents[a]					
Baseline year	160	140			
Months 1-12	184	122	42 (41)	32%	0.31

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	95	143	-68 (60)	-35%	0.26
Cumulative (months 1-24)	153	128	5.0 (43)	3.4%	0.91
Adults[a]					
Baseline year	761	783			
Months 1-12	619	823	-182 (78)*	-23%	0.02
Months 13-24	562	587	-3.3 (95)	<1%	0.97
Cumulative (months 1-24)	607	741	-112 (72)	-15%	0.12
Beneficiaries with SUD[b]					
Baseline year	863	944			
Months 1-12	693	977	-204 (101)*	-22%	0.04
Months 13-24	635	750	-34 (123)	-4.4%	0.78
Cumulative (months 1-24)	684	895	-131 (93)	-15%	0.16
Beneficiaries with a first visit in DY1[c]					
Baseline year	1,001	748			
Months 1-12	802	690	-141 (137)	-15%	0.30
Months 13-24	801	561	-12 (157)	-1.3%	0.94
Cumulative (months 1-24)	805	628	-76 (127)	-8.3%	0.55
Beneficiaries with a first visit in DY2[c]					
Baseline year	583	553			
Months 1-12	728	640	57 (112)	8.0%	0.61
Months 13-24	471	426	15 (124)	3.1%	0.90
Cumulative (months 1-24)	612	539	43 (103)	7.2%	0.68
Beneficiaries with a first visit in DY3[c]					
Baseline year	420	571			
Months 1-12	366	596	-79 (62)	-18%	0.20
Months 13-24	294	445	1.00 (101)	<1%	0.99
Cumulative (months 1-24)	347	554	-55 (68)	-14%	0.42
Beneficiaries with a first visit in DY4[c]					
Baseline year	695	701			
Months 1-12	287	758	-465 (239)	-63%	0.05
Physical health-related ED visits per 1,000 beneficiaries per year[d]					
Children and adolescents[a]					
Baseline year	626	657			
Months 1-12	585	546	70 (91)	14%	0.44
Months 13-24	332	483	-120 (106)	-22%	0.26
Cumulative (months 1-24)	502	517	16 (80)	3.2%	0.84
Adults[a]					
Baseline year	1,528	1,574			
Months 1-12	1,293	1,379	-40 (99)	-3.1%	0.69

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	1,001	1,138	-91 (126)	-8.1%	0.47
Cumulative (months 1-24)	1,198	1,291	-47 (94)	-3.9%	0.62
Beneficiaries with SUD[b]					
Baseline year	1,486	1,597			
Months 1-12	1,209	1,428	-108 (125)	-8.3%	0.39
Months 13-24	935	1,256	-210 (156)	-18%	0.18
Cumulative (months 1-24)	1,127	1,359	-121 (117)	-9.8%	0.30
Beneficiaries with a first visit in DY1[c]					
Baseline year	1,710	1,513			
Months 1-12	1,650	1,479	-25 (197)	-1.5%	0.90
Months 13-24	1,174	1,561	-584 (244)*	-34%	0.02
Cumulative (months 1-24)	1,458	1,514	-253 (195)	-15%	0.20
Beneficiaries with a first visit in DY2[c]					
Baseline year	1,329	1,312			
Months 1-12	1,271	1,156	98 (148)	8.3%	0.51
Months 13-24	904	844	42 (166)	5.0%	0.80
Cumulative (months 1-24)	1,109	1,002	89 (146)	8.8%	0.54
Beneficiaries with a first visit in DY3[c]					
Baseline year	1,134	1,316			
Months 1-12	940	1,109	13 (86)	1.4%	0.88
Months 13-24	678	699	161 (123)	29%	0.19
Cumulative (months 1-24)	855	971	66 (86)	8.6%	0.44
Beneficiaries with a first visit in DY4[c]					
Baseline year	1,238	1,266			
Months 1-12	774	935	-133 (286)	-15%	0.64
Percentage with any ED visit					
Children and adolescents[a]					
Baseline year	42	39			
Months 1-12	34	34	-3.0 (3.8)	-8.1%	0.43
Months 13-24	30	33	-6.0 (4.1)	-17%	0.14
Cumulative (months 1-24)	49	52	-6.5 (3.8)	-12%	0.09
Adults[a]					
Baseline year	64	65			
Months 1-12	60	60	1.2 (2.0)	2.0%	0.56
Months 13-24	50	50	2.1 (2.6)	4.4%	0.42
Cumulative (months 1-24)	73	73	1.4 (2.0)	1.9%	0.48
Beneficiaries with SUD[b]					
Baseline year	64	68			
Months 1-12	60	63	2.0 (2.5)	3.5%	0.42

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	51	53	1.7 (3.2)	3.5%	0.59
Cumulative (months 1-24)	73	76	1.4 (2.4)	2.0%	0.55
Beneficiaries with a first visit in DY1[c]					
Baseline year	70	67			
Months 1-12	67	61	2.4 (4.2)	3.8%	0.56
Months 13-24	61	59	-1.2 (4.8)	-1.9%	0.80
Cumulative (months 1-24)	80	76	0.58 (4.1)	<1%	0.89
Beneficiaries with a first visit in DY2[c]					
Baseline year	61	59			
Months 1-12	62	57	2.8 (4.1)	4.8%	0.49
Months 13-24	47	48	-2.9 (4.6)	-5.8%	0.53
Cumulative (months 1-24)	71	72	-3.2 (4.0)	-4.3%	0.43
Beneficiaries with a first visit in DY3[c]					
Baseline year	53	58			
Months 1-12	48	52	0.54 (2.6)	1.1%	0.83
Months 13-24	34	38	0.58 (3.1)	1.7%	0.85
Cumulative (months 1-24)	62	65	1.2 (2.5)	1.9%	0.64
Beneficiaries with a first visit in DY4[c]					
Baseline year	54	56			
Months 1-12	43	50	-5.4 (4.7)	-11%	0.25

Source: Mathematica analyses of Nevada TAF data, 2015 – 2021.

Note: We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] We defined the children/adolescents and adult subgroups based on age at the first visit date. We categorized beneficiaries as children/adolescents if they were under the age of 19 and adults if they were age 19 or older.

[b] We identified the presence of SUD based on relevant diagnosis codes in the 24 months before enrollment, the maximum amount of baseline TAF data available for beneficiaries with enrollment dates at the start of the demonstration, and in the 30 days following the first visit date (to identify beneficiaries newly seeking care for SUD).

[c] The CCBHC demonstration started in Nevada on July 1, 2017. Demonstration year 1 spans July 1, 2017 to June 30, 2018; demonstration year 2 spans July 1, 2018 to June 30, 2019; demonstration year 3 spans July 1, 2019 to June 30, 2020; demonstration year 4 spans July 1, 2020 to June 30, 2021, but the demonstration year 4 cohort includes only those beneficiaries with a first visit date between July 1, 2020 and December 31, 2020, due to data availability. We also only have a maximum of one year of follow-up data for beneficiaries in cohort 4 because TAF data were only available through December 31, 2021.

[d] We identified stays and visit as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health related. For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

DY = demonstration year; ED = emergency department; SUD = substance use disorder; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.14. Impacts on ambulatory visits by subgroup: Nevada

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
All-cause ambulatory visits per 1,000 beneficiaries per year					
Children and adolescents[a]					
Baseline year	11,385	14,923			
Months 1-12	19,799	23,438	-101 (1,451)	<1%	0.94
Months 13-24	7,396	12,235	-1,300 (2,187)	-11%	0.55
Cumulative (months 1-24)	15,580	19,864	-746 (1,525)	-4.4%	0.62
Adults[a]					
Baseline year	15,343	15,382			
Months 1-12	36,979	29,330	7,687 (1,317)***	27%	<0.01
Months 13-24	16,348	16,207	179 (1,495)	<1%	0.90
Cumulative (months 1-24)	30,169	25,309	4,899 (1,202)***	19%	<0.01
Beneficiaries with SUD[b]					
Baseline year	15,890	16,591			
Months 1-12	39,254	31,319	8,635 (1,659)***	29%	<0.01
Months 13-24	16,421	15,755	1,367 (1,869)	7.8%	0.46
Cumulative (months 1-24)	31,743	26,487	5,956 (1,507)***	23%	<0.01
Beneficiaries with a first visit in DY1[c]					
Baseline year	16,314	27,890			
Months 1-12	43,407	35,884	19,098 (3,274)***	79%	<0.01
Months 13-24	17,013	20,719	7,869 (3,010)**	82%	<0.01
Cumulative (months 1-24)	32,218	29,828	13,965 (2,866)***	78%	<0.01
Beneficiaries with a first visit in DY2[c]					
Baseline year	12,692	16,077			
Months 1-12	30,681	31,533	2,533 (2,397)	9.1%	0.29
Months 13-24	20,117	20,932	2,570 (2,788)	15%	0.36
Cumulative (months 1-24)	25,867	26,838	2,414 (2,248)	10%	0.28
Beneficiaries with a first visit in DY3[c]					
Baseline year	16,329	11,055			
Months 1-12	30,747	25,083	389 (1,293)	1.3%	0.76
Months 13-24	11,961	13,523	-6,837 (1,404)***	-31%	<0.01
Cumulative (months 1-24)	24,399	21,735	-2,610 (1,184)*	-9.6%	0.03
Beneficiaries with a first visit in DY4[c]					
Baseline year	8,397	9,421			
Months 1-12	27,160	20,915	7,270 (2,377)**	37%	<0.01
Behavioral health-related ambulatory visits per 1,000 beneficiaries per year[d]					
Children and adolescents[a]					
Baseline year	5,741	8,787			
Months 1-12	14,182	16,907	321 (1,207)	2.3%	0.79

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	4,500	8,069	-523 (1,783)	-7.9%	0.77
Cumulative (months 1-24)	10,949	14,147	-152 (1,263)	-1.4%	0.90
Adults[a]					
Baseline year	10,536	10,220			
Months 1-12	31,118	23,577	7,224 (1,223)***	31%	<0.01
Months 13-24	12,268	11,537	415 (1,388)	2.9%	0.76
Cumulative (months 1-24)	24,903	19,929	4,657 (1,103)***	23%	<0.01
Beneficiaries with SUD[b]					
Baseline year	11,700	12,082			
Months 1-12	34,213	26,206	8,389 (1,547)***	33%	<0.01
Months 13-24	12,639	11,886	1,134 (1,761)	8.2%	0.52
Cumulative (months 1-24)	27,114	21,793	5,702 (1,391)***	27%	<0.01
Beneficiaries with a first visit in DY1[c]					
Baseline year	11,125	19,476			
Months 1-12	36,716	27,240	17,827 (3,010)***	94%	<0.01
Months 13-24	12,905	14,009	7,247 (2,738)**	124%	<0.01
Cumulative (months 1-24)	26,587	22,081	12,857 (2,561)***	95%	<0.01
Beneficiaries with a first visit in DY2[c]					
Baseline year	6,687	10,929			
Months 1-12	23,491	24,753	2,980 (2,138)	15%	0.16
Months 13-24	15,030	15,403	3,869 (2,439)	37%	0.11
Cumulative (months 1-24)	19,596	20,615	3,223 (1,960)	20%	0.10
Beneficiaries with a first visit in DY3[c]					
Baseline year	11,376	6,364			
Months 1-12	25,252	20,013	227 (1,211)	<1%	0.85
Months 13-24	8,585	9,909	-6,336 (1,290)***	-36%	<0.01
Cumulative (months 1-24)	19,614	17,055	-2,453 (1,092)*	-11%	0.02
Beneficiaries with a first visit in DY4[c]					
Baseline year	4,685	5,690			
Months 1-12	23,357	17,269	7,093 (2,165)**	44%	<0.01
Physical health-related ambulatory visits per 1,000 beneficiaries per year[d]					
Children and adolescents[a]					
Baseline year	5,643	6,135			
Months 1-12	5,617	6,531	-423 (758)	-6.8%	0.58
Months 13-24	2,896	4,165	-777 (1,101)	-16%	0.48
Cumulative (months 1-24)	4,631	5,717	-594 (759)	-10%	0.43
Adults[a]					
Baseline year	4,807	5,162			
Months 1-12	5,861	5,753	463 (420)	8.8%	0.27

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	4,080	4,670	-236 (560)	-4.8%	0.67
Cumulative (months 1-24)	5,267	5,380	241 (425)	4.8%	0.57
Beneficiaries with SUD[b]					
Baseline year	4,190	4,509			
Months 1-12	5,041	5,114	246 (530)	5.2%	0.64
Months 13-24	3,782	3,869	233 (637)	6.3%	0.72
Cumulative (months 1-24)	4,630	4,694	254 (521)	5.8%	0.63
Beneficiaries with a first visit in DY1[c]					
Baseline year	5,189	8,414			
Months 1-12	6,691	8,645	1,271 (1,254)	25%	0.31
Months 13-24	4,107	6,710	622 (1,361)	17%	0.65
Cumulative (months 1-24)	5,630	7,747	1,108 (1,272)	25%	0.38
Beneficiaries with a first visit in DY2[c]					
Baseline year	6,006	5,149			
Months 1-12	7,191	6,780	-446 (950)	-5.7%	0.64
Months 13-24	5,087	5,530	-1,300 (1,202)	-19%	0.28
Cumulative (months 1-24)	6,271	6,222	-809 (951)	-11%	0.40
Beneficiaries with a first visit in DY3[c]					
Baseline year	4,953	4,691			
Months 1-12	5,495	5,070	163 (395)	3.1%	0.68
Months 13-24	3,376	3,615	-500 (497)	-11%	0.31
Cumulative (months 1-24)	4,784	4,680	-158 (390)	-3.2%	0.69
Beneficiaries with a first visit in DY4[c]					
Baseline year	3,712	3,731			
Months 1-12	3,803	3,645	177 (705)	4.8%	0.80

Source: Mathematica analyses of Nevada TAF data, 2015 – 2021.

Note: We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] We defined the children/adolescents and adult subgroups based on age at the first visit date. We categorized beneficiaries as children/adolescents if they were under the age of 19 and adults if they were age 19 or older.

[b] We identified the presence of SUD based on relevant diagnosis codes in the 24 months before enrollment, the maximum amount of baseline TAF data available for beneficiaries with enrollment dates at the start of the demonstration, and in the 30 days following the first visit date (to identify beneficiaries newly seeking care for SUD).

[c] The CCBHC demonstration started in Nevada on July 1, 2017. Demonstration year 1 spans July 1, 2017 to June 30, 2018; demonstration year 2 spans July 1, 2018 to June 30, 2019; demonstration year 3 spans July 1, 2019 to June 30, 2020; demonstration year 4 spans July 1, 2020 to June 30, 2021, but the demonstration year 4 cohort includes only those beneficiaries with a first visit date between July 1, 2020 and December 31, 2020, due to data availability. We also only have a maximum of one year of follow-up data for beneficiaries in cohort 4 because TAF data were only available through December 31, 2021.

[d] We identified stays and visit as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health related. For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

DY = demonstration year; SUD = substance use disorder; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.15. Impacts on hospitalizations by subgroup: Oklahoma

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
All-cause hospitalizations per 1,000 beneficiaries per year					
Children and adolescents[a]					
Baseline year	182	182			
Months 1-12	159	138	21 (12)	15%	0.08
Months 13-24	127	97	30 (13)*	35%	0.02
Cumulative (months 1-24)	145	121	24 (11)*	20%	0.03
Adults[a]					
Baseline year	487	510			
Months 1-12	368	454	-63 (27)*	-15%	0.02
Months 13-24	342	431	-67 (34)*	-17%	0.05
Cumulative (months 1-24)	359	444	-63 (25)*	-15%	0.01
Beneficiaries with SUD[b]					
Baseline year	773	818			
Months 1-12	497	659	-117 (52)*	-19%	0.02
Months 13-24	440	597	-112 (63)	-21%	0.08
Cumulative (months 1-24)	476	634	-112 (49)*	-19%	0.02
Beneficiaries with a first visit in DY1[c]					
Baseline year	305	306			
Months 1-12	269	285	-15 (19)	-5.2%	0.45
Months 13-24	233	258	-24 (22)	-10.0%	0.27
Cumulative (months 1-24)	252	271	-18 (18)	-6.8%	0.32
Beneficiaries with a first visit in DY2[c]					
Baseline year	263	294			
Months 1-12	226	282	-25 (27)	-10%	0.35
Months 13-24	190	213	7.4 (26)	4.7%	0.78
Cumulative (months 1-24)	207	248	-9.8 (23)	-4.8%	0.67
Beneficiaries with a first visit in DY3[c]					
Baseline year	267	277			
Months 1-12	214	217	6.6 (23)	3.3%	0.77
Months 13-24	128	120	18 (28)	17%	0.52
Cumulative (months 1-24)	181	180	10 (21)	6.4%	0.63
Beneficiaries with a first visit in DY4[c]					
Baseline year	320	314			
Months 1-12	175	162	6.9 (33)	4.1%	0.84
Behavioral health-related hospitalizations per 1,000 beneficiaries per year[d]					
Children and adolescents[a]					
Baseline year	166	160			
Months 1-12	146	124	16 (12)	12%	0.17

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	108	80	22 (13)	29%	0.08
Cumulative (months 1-24)	130	107	17 (11)	16%	0.10
Adults[a]					
Baseline year	392	403			
Months 1-12	303	355	-40 (24)	-12%	0.10
Months 13-24	267	331	-52 (30)	-17%	0.08
Cumulative (months 1-24)	290	345	-44 (23)	-13%	0.05
Beneficiaries with SUD[b]					
Baseline year	695	721			
Months 1-12	435	570	-108 (48)*	-20%	0.02
Months 13-24	384	504	-94 (59)	-21%	0.11
Cumulative (months 1-24)	416	545	-103 (45)*	-20%	0.02
Beneficiaries with a first visit in DY1[c]					
Baseline year	262	258			
Months 1-12	233	237	-7.8 (18)	-3.3%	0.66
Months 13-24	189	207	-22 (20)	-11%	0.27
Cumulative (months 1-24)	213	222	-13 (17)	-6.1%	0.42
Beneficiaries with a first visit in DY2[c]					
Baseline year	225	233			
Months 1-12	192	224	-24 (24)	-12%	0.32
Months 13-24	156	160	4.8 (24)	3.6%	0.84
Cumulative (months 1-24)	173	192	-11 (21)	-6.3%	0.60
Beneficiaries with a first visit in DY3[c]					
Baseline year	220	224			
Months 1-12	183	178	8.7 (21)	5.3%	0.68
Months 13-24	104	92	16 (24)	19%	0.51
Cumulative (months 1-24)	153	148	9.0 (19)	6.6%	0.64
Beneficiaries with a first visit in DY4[c]					
Baseline year	264	263			
Months 1-12	156	140	15 (30)	10%	0.63
Physical health-related hospitalizations per 1,000 beneficiaries per year[d]					
Children and adolescents[a]					
Baseline year	16	22			
Months 1-12	13	14	5.1 (3.4)	61%	0.13
Months 13-24	19	17	7.8 (4.1)	101%	0.06
Cumulative (months 1-24)	15	15	6.6 (3.2)*	85%	0.04
Adults[a]					
Baseline year	95	106			
Months 1-12	65	99	-23 (11)*	-28%	0.03

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	75	100	-15 (13)	-17%	0.27
Cumulative (months 1-24)	69	99	-19 (10.0)	-23%	0.06
Beneficiaries with SUD[b]					
Baseline year	78	97			
Months 1-12	62	89	-8.1 (16)	-12%	0.62
Months 13-24	56	93	-18 (20)	-25%	0.36
Cumulative (months 1-24)	60	88	-9.5 (15)	-14%	0.54
Beneficiaries with a first visit in DY1[c]					
Baseline year	43	48			
Months 1-12	36	48	-6.9 (6.7)	-17%	0.31
Months 13-24	44	52	-2.3 (7.4)	-5.3%	0.76
Cumulative (months 1-24)	39	49	-4.5 (6.1)	-11%	0.46
Beneficiaries with a first visit in DY2[c]					
Baseline year	38	61			
Months 1-12	34	58	-1.0 (10.0)	-3.0%	0.92
Months 13-24	33	53	2.7 (9.7)	10%	0.78
Cumulative (months 1-24)	34	56	1.1 (8.6)	3.6%	0.90
Beneficiaries with a first visit in DY3[c]					
Baseline year	47	53			
Months 1-12	31	39	-2.2 (8.6)	-7.1%	0.80
Months 13-24	24	28	2.1 (13)	10%	0.87
Cumulative (months 1-24)	28	32	1.2 (8.7)	4.8%	0.89
Beneficiaries with a first visit in DY4[c]					
Baseline year	55	51			
Months 1-12	19	22	-7.8 (11)	-34%	0.50
Percentage with any hospitalization					
Children and adolescents[a]					
Baseline year	13	13			
Months 1-12	11	8.9	1.4 (0.69)*	16%	0.04
Months 13-24	8.1	6.2	1.7 (0.75)*	26%	0.02
Cumulative (months 1-24)	16	14	2.2 (0.77)**	16%	<0.01
Adults[a]					
Baseline year	30	28			
Months 1-12	21	22	-2.0 (1.3)	-8.7%	0.12
Months 13-24	20	19	-0.49 (1.4)	-2.5%	0.73
Cumulative (months 1-24)	33	34	-2.4 (1.4)	-6.8%	0.08
Beneficiaries with SUD[b]					
Baseline year	42	41			
Months 1-12	26	28	-2.1 (2.2)	-7.6%	0.34

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	23	23	0.32 (2.4)	1.4%	0.89
Cumulative (months 1-24)	38	40	-3.2 (2.3)	-7.8%	0.17
Beneficiaries with a first visit in DY1[c]					
Baseline year	19	19			
Months 1-12	16	16	-0.67 (0.98)	-4.1%	0.50
Months 13-24	14	13	0.01 (1.0)	<1%	0.99
Cumulative (months 1-24)	24	24	-0.92 (1.0)	-3.7%	0.38
Beneficiaries with a first visit in DY2[c]					
Baseline year	18	18			
Months 1-12	14	13	1.1 (1.3)	8.7%	0.41
Months 13-24	11	8.9	2.7 (1.4)*	31%	0.05
Cumulative (months 1-24)	21	19	1.9 (1.4)	9.8%	0.19
Beneficiaries with a first visit in DY3[c]					
Baseline year	19	16			
Months 1-12	13	10	0.92 (1.3)	7.6%	0.48
Months 13-24	8.8	6.7	0.10 (1.5)	1.1%	0.95
Cumulative (months 1-24)	20	15	1.9 (1.5)	11%	0.18
Beneficiaries with a first visit in DY4[c]					
Baseline year	22	23			
Months 1-12	12	12	0.91 (1.9)	8.5%	0.63

Source: Mathematica analyses of Oklahoma TAF data, 2015 – 2021.

Note: We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] We defined the children/adolescents and adult subgroups were defined based on age at the first visit date. We categorized beneficiaries as children/adolescents if they were under the age of 19 and adults if they were age 19 or older.

[b] We identified the presence of SUD based on relevant diagnosis codes in the 24 months before enrollment, the maximum amount of baseline TAF data available for beneficiaries with enrollment dates at the start of the demonstration, and in the 30 days following the first visit date (to identify beneficiaries newly seeking care for SUD).

[c] The CCBHC demonstration started in Oklahoma on April 1, 2017. Demonstration year 1 spans April 1, 2017 to March 31, 2018; demonstration year 2 spans April 1, 2018 to March 31, 2019; demonstration year 3 spans April 1, 2019 to March 31, 2020; demonstration year 4 spans April 1, 2020 to March 31, 2021, but the demonstration year 4 cohort includes only those beneficiaries with a first visit date between April 1, 2020 and December 31, 2020, due to data availability. We also only have a maximum of one year of follow-up data for beneficiaries in cohort 4 because TAF data were only available through December 31, 2021.

[d] We identified stays and visit as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health related. For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

DY = demonstration year; SUD = substance use disorder; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.16. Impacts on emergency department visits by subgroup: Oklahoma

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
All-cause ED visits per 1,000 beneficiaries per year					
Children and adolescents[a]					
Baseline year	800	767			
Months 1-12	774	649	91 (25)***	13%	<0.01
Months 13-24	697	597	66 (32)*	11%	0.04
Cumulative (months 1-24)	740	626	80 (24)***	12%	<0.01
Adults[a]					
Baseline year	2,344	2,499			
Months 1-12	2,237	2,347	45 (83)	2.1%	0.59
Months 13-24	1,817	2,137	-165 (115)	-8.1%	0.15
Cumulative (months 1-24)	2,072	2,263	-36 (84)	-1.7%	0.67
Beneficiaries with SUD[b]					
Baseline year	2,642	2,961			
Months 1-12	2,397	2,777	-62 (141)	-2.6%	0.66
Months 13-24	1,926	2,549	-305 (170)	-14%	0.07
Cumulative (months 1-24)	2,205	2,688	-165 (135)	-7.0%	0.22
Beneficiaries with a first visit in DY1[c]					
Baseline year	1,467	1,536			
Months 1-12	1,463	1,509	23 (53)	1.6%	0.67
Months 13-24	1,296	1,425	-60 (60)	-4.6%	0.31
Cumulative (months 1-24)	1,383	1,465	-12 (50)	<1%	0.80
Beneficiaries with a first visit in DY2[c]					
Baseline year	1,357	1,236			
Months 1-12	1,370	1,206	43 (72)	3.3%	0.55
Months 13-24	1,106	1,072	-87 (107)	-7.6%	0.41
Cumulative (months 1-24)	1,248	1,153	-26 (78)	-2.1%	0.73
Beneficiaries with a first visit in DY3[c]					
Baseline year	1,206	1,359			
Months 1-12	1,159	1,142	170 (68)*	18%	0.01
Months 13-24	650	654	149 (84)	31%	0.08
Cumulative (months 1-24)	958	913	199 (65)**	28%	<0.01
Beneficiaries with a first visit in DY4[c]					
Baseline year	1,181	1,153			
Months 1-12	886	763	95 (84)	12%	0.26
Behavioral health-related ED visits per 1,000 beneficiaries per year[d]					
Children and adolescents[a]					
Baseline year	107	97			
Months 1-12	116	83	24 (9.8)*	26%	0.02

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	127	90	28 (11)*	35%	0.01
Cumulative (months 1-24)	119	84	26 (9.1)**	30%	<0.01
Adults[a]					
Baseline year	569	534			
Months 1-12	568	502	32 (35)	6.1%	0.35
Months 13-24	481	460	-14 (42)	-2.8%	0.74
Cumulative (months 1-24)	533	485	13 (32)	2.5%	0.69
Beneficiaries with SUD[b]					
Baseline year	734	830			
Months 1-12	723	728	91 (62)	14%	0.14
Months 13-24	579	675	0.58 (76)	<1%	0.99
Cumulative (months 1-24)	663	709	50 (59)	8.4%	0.39
Beneficiaries with a first visit in DY1[c]					
Baseline year	289	277			
Months 1-12	310	278	20 (20)	7.2%	0.31
Months 13-24	302	278	12 (24)	4.7%	0.60
Cumulative (months 1-24)	305	278	16 (19)	5.7%	0.42
Beneficiaries with a first visit in DY2[c]					
Baseline year	271	214			
Months 1-12	307	203	48 (29)	19%	0.10
Months 13-24	246	194	-5.3 (28)	-2.3%	0.85
Cumulative (months 1-24)	277	199	21 (26)	8.6%	0.41
Beneficiaries with a first visit in DY3[c]					
Baseline year	243	242			
Months 1-12	236	231	3.5 (29)	1.5%	0.91
Months 13-24	123	98	24 (34)	23%	0.48
Cumulative (months 1-24)	193	170	22 (25)	13%	0.38
Beneficiaries with a first visit in DY4[c]					
Baseline year	258	249			
Months 1-12	198	154	35 (42)	21%	0.41
Physical health-related ED visits per 1,000 beneficiaries per year[d]					
Children and adolescents[a]					
Baseline year	694	669			
Months 1-12	658	566	68 (23)**	11%	<0.01
Months 13-24	570	507	38 (28)	7.1%	0.17
Cumulative (months 1-24)	621	543	54 (21)*	9.4%	0.01
Adults[a]					
Baseline year	1,775	1,965			
Months 1-12	1,668	1,846	12 (69)	<1%	0.86

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	1,336	1,677	-151 (99)	-9.8%	0.13
Cumulative (months 1-24)	1,539	1,777	-49 (70)	-3.1%	0.49
Beneficiaries with SUD[b]					
Baseline year	1,908	2,130			
Months 1-12	1,674	2,049	-154 (113)	-8.6%	0.17
Months 13-24	1,347	1,874	-305 (133)*	-18%	0.02
Cumulative (months 1-24)	1,542	1,979	-215 (107)*	-12%	0.04
Beneficiaries with a first visit in DY1[c]					
Baseline year	1,178	1,259			
Months 1-12	1,153	1,231	2.7 (46)	<1%	0.95
Months 13-24	994	1,147	-73 (50)	-6.9%	0.15
Cumulative (months 1-24)	1,078	1,187	-28 (42)	-2.6%	0.51
Beneficiaries with a first visit in DY2[c]					
Baseline year	1,086	1,022			
Months 1-12	1,063	1,003	-4.8 (61)	<1%	0.94
Months 13-24	861	878	-82 (98)	-8.9%	0.40
Cumulative (months 1-24)	971	954	-47 (69)	-4.8%	0.49
Beneficiaries with a first visit in DY3[c]					
Baseline year	964	1,118			
Months 1-12	923	910	167 (57)**	23%	<0.01
Months 13-24	527	556	125 (68)	33%	0.06
Cumulative (months 1-24)	765	742	176 (54)**	32%	<0.01
Beneficiaries with a first visit in DY4[c]					
Baseline year	924	904			
Months 1-12	688	609	60 (67)	9.6%	0.37
Percentage with any ED visit					
Children and adolescents[a]					
Baseline year	43	42			
Months 1-12	40	35	4.0 (1.0)***	11%	<0.01
Months 13-24	36	33	2.5 (1.1)*	7.4%	0.03
Cumulative (months 1-24)	56	51	4.4 (1.0)***	8.4%	<0.01
Adults[a]					
Baseline year	64	64			
Months 1-12	62	59	2.9 (1.2)*	4.9%	0.02
Months 13-24	56	55	1.4 (1.5)	2.6%	0.34
Cumulative (months 1-24)	76	73	3.5 (1.2)**	4.8%	<0.01
Beneficiaries with SUD[b]					
Baseline year	67	69			
Months 1-12	63	61	4.5 (2.1)*	7.7%	0.03

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	56	59	-0.53 (2.4)	<1%	0.82
Cumulative (months 1-24)	77	74	4.6 (1.9)*	6.4%	0.02
Beneficiaries with a first visit in DY1[c]					
Baseline year	53	52			
Months 1-12	52	49	3.4 (1.2)**	6.9%	<0.01
Months 13-24	48	47	1.3 (1.3)	2.7%	0.31
Cumulative (months 1-24)	68	64	3.7 (1.2)**	5.7%	<0.01
Beneficiaries with a first visit in DY2[c]					
Baseline year	50	50			
Months 1-12	49	46	2.1 (1.7)	4.6%	0.20
Months 13-24	41	36	4.1 (1.8)*	11%	0.02
Cumulative (months 1-24)	63	59	3.5 (1.7)*	5.9%	0.04
Beneficiaries with a first visit in DY3[c]					
Baseline year	48	47			
Months 1-12	44	39	4.2 (1.7)*	10%	0.02
Months 13-24	32	28	3.6 (2.1)	12%	0.08
Cumulative (months 1-24)	58	52	4.4 (1.8)*	8.3%	0.01
Beneficiaries with a first visit in DY4[c]					
Baseline year	48	45			
Months 1-12	40	33	5.4 (2.2)*	16%	0.01

Source: Mathematica analyses of Oklahoma TAF data, 2015 – 2021.

Note: We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] We defined the children/adolescents and adult subgroups were defined based on age at the first visit date. We categorized beneficiaries as children/adolescents if they were under the age of 19 and adults if they were age 19 or older.

[b] We identified the presence of SUD based on relevant diagnosis codes in the 24 months before enrollment, the maximum amount of baseline TAF data available for beneficiaries with enrollment dates at the start of the demonstration, and in the 30 days following the first visit date (to identify beneficiaries newly seeking care for SUD).

[c] The CCBHC demonstration started in Oklahoma on April 1, 2017. Demonstration year 1 spans April 1, 2017 to March 31, 2018; demonstration year 2 spans April 1, 2018 to March 31, 2019; demonstration year 3 spans April 1, 2019 to March 31, 2020; demonstration year 4 spans April 1, 2020 to March 31, 2021, but the demonstration year 4 cohort includes only those beneficiaries with a first visit date between April 1, 2020 and December 31, 2020, due to data availability. We also only have a maximum of one year of follow-up data for beneficiaries in cohort 4 because TAF data were only available through December 31, 2021.

[d] We identified stays and visit as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health related. For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

DY = demonstration year; ED = emergency department; SUD = substance use disorder; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.17. Impacts on total Medicaid costs by subgroup: Oklahoma

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Total costs per beneficiary per month (PBPM)					
Children and adolescents[a]					
Baseline year	596	551			
Months 1-12	1,076	682	349 (21)***	48%	<0.01
Months 13-24	715	550	120 (28)***	20%	<0.01
Cumulative (months 1-24)	936	633	258 (20)***	38%	<0.01
Adults[a]					
Baseline year	1,008	1,074			
Months 1-12	1,347	1,245	169 (36)***	14%	<0.01
Months 13-24	1,202	1,242	26 (45)	2.0%	0.56
Cumulative (months 1-24)	1,290	1,245	112 (34)***	9.1%	<0.01
Beneficiaries with SUD[b]					
Baseline year	1,310	1,240			
Months 1-12	1,504	1,279	156 (66)*	11%	0.02
Months 13-24	1,256	1,214	-28 (76)	-2.0%	0.71
Cumulative (months 1-24)	1,405	1,255	80 (60)	5.8%	0.18
Beneficiaries with a first visit in DY1[c]					
Baseline year	896	783			
Months 1-12	1,346	946	287 (27)***	27%	<0.01
Months 13-24	1,042	889	40 (33)	3.9%	0.23
Cumulative (months 1-24)	1,209	920	176 (25)***	17%	<0.01
Beneficiaries with a first visit in DY2[c]					
Baseline year	608	752			
Months 1-12	1,062	938	268 (39)***	34%	<0.01
Months 13-24	782	840	86 (48)	12%	0.07
Cumulative (months 1-24)	936	900	180 (37)***	24%	<0.01
Beneficiaries with a first visit in DY3[c]					
Baseline year	587	676			
Months 1-12	1,023	839	273 (42)***	37%	<0.01
Months 13-24	711	598	202 (55)***	41%	<0.01
Cumulative (months 1-24)	900	740	249 (43)***	39%	<0.01
Beneficiaries with a first visit in DY4[c]					
Baseline year	678	658			
Months 1-12	1,014	681	313 (54)***	45%	<0.01
Total behavioral health-related costs PBPM[d]					
Children and adolescents[a]					
Baseline year	328	279			
Months 1-12	763	397	318 (19)***	72%	<0.01

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	426	276	102 (24)***	29%	<0.01
Cumulative (months 1-24)	634	353	233 (18)***	58%	<0.01
Adults[a]					
Baseline year	346	339			
Months 1-12	605	420	177 (19)***	41%	<0.01
Months 13-24	447	365	75 (21)***	18%	<0.01
Cumulative (months 1-24)	543	401	136 (17)***	32%	<0.01
Beneficiaries with SUD[b]					
Baseline year	623	521			
Months 1-12	788	540	146 (42)***	22%	<0.01
Months 13-24	575	460	14 (48)	2.3%	0.77
Cumulative (months 1-24)	705	513	91 (38)*	14%	0.02
Beneficiaries with a first visit in DY1[c]					
Baseline year	425	340			
Months 1-12	827	429	313 (19)***	60%	<0.01
Months 13-24	515	340	90 (23)***	20%	<0.01
Cumulative (months 1-24)	687	390	212 (18)***	44%	<0.01
Beneficiaries with a first visit in DY2[c]					
Baseline year	256	297			
Months 1-12	626	432	235 (31)***	60%	<0.01
Months 13-24	392	357	76 (37)*	25%	0.04
Cumulative (months 1-24)	519	403	156 (29)***	44%	<0.01
Beneficiaries with a first visit in DY3[c]					
Baseline year	246	246			
Months 1-12	599	386	213 (36)***	56%	<0.01
Months 13-24	368	246	122 (45)**	49%	<0.01
Cumulative (months 1-24)	510	332	178 (37)***	54%	<0.01
Beneficiaries with a first visit in DY4[c]					
Baseline year	289	262			
Months 1-12	611	322	263 (39)***	76%	<0.01
Total physical health-related costs PBPM[d]					
Children and adolescents[a]					
Baseline year	176	175			
Months 1-12	212	189	21 (7.8)**	11%	<0.01
Months 13-24	190	175	14 (10)	8.6%	0.17
Cumulative (months 1-24)	202	182	18 (7.1)*	10%	0.01
Adults[a]					
Baseline year	358	491			
Months 1-12	387	526	-6.5 (20)	-1.7%	0.74

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 13-24	395	552	-25 (28)	-5.9%	0.37
Cumulative (months 1-24)	388	534	-14 (19)	-3.4%	0.47
Beneficiaries with SUD[b]					
Baseline year	366	470			
Months 1-12	386	468	23 (34)	6.3%	0.50
Months 13-24	373	486	-7.5 (38)	-2.0%	0.84
Cumulative (months 1-24)	378	472	11 (30)	2.9%	0.72
Beneficiaries with a first visit in DY1[c]					
Baseline year	249	274			
Months 1-12	276	312	-11 (13)	-3.8%	0.40
Months 13-24	281	329	-23 (17)	-7.6%	0.18
Cumulative (months 1-24)	277	318	-15 (12)	-5.3%	0.20
Beneficiaries with a first visit in DY2[c]					
Baseline year	234	315			
Months 1-12	287	356	12 (17)	4.2%	0.49
Months 13-24	246	325	1.9 (23)	<1%	0.93
Cumulative (months 1-24)	268	341	8.3 (17)	3.2%	0.63
Beneficiaries with a first visit in DY3[c]					
Baseline year	227	301			
Months 1-12	271	305	39 (15)*	17%	0.01
Months 13-24	207	232	49 (20)*	33%	0.02
Cumulative (months 1-24)	243	269	47 (15)**	25%	<0.01
Beneficiaries with a first visit in DY4[c]					
Baseline year	245	269			
Months 1-12	257	245	36 (29)	17%	0.21

Source: Mathematica analyses of Oklahoma TAF data, 2015 – 2021.

Note: We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] We defined the children/adolescents and adult subgroups based on age at the first visit date. We categorized beneficiaries as children/adolescents if they were under the age of 19 and adults if they were age 19 or older.

[b] We identified the presence of SUD based on relevant diagnosis codes in the 24 months before enrollment, the maximum amount of baseline TAF data available for beneficiaries with enrollment dates at the start of the demonstration, and in the 30 days following the first visit date (to identify beneficiaries newly seeking care for SUD).

[c] The CCBHC demonstration started in Oklahoma on April 1, 2017. Demonstration year 1 spans April 1, 2017 to March 31, 2018; demonstration year 2 spans April 1, 2018 to March 31, 2019; demonstration year 3 spans April 1, 2019 to March 31, 2020; demonstration year 4 spans April 1, 2020 to March 31, 2021, but the demonstration year 4 cohort includes only those beneficiaries with a first visit date between April 1, 2020 and December 31, 2020, due to data availability. We also only have a maximum of one year of follow-up data for beneficiaries in cohort 4 because TAF data were only available through December 31, 2021.

[d] We identified stays and visit as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health related. For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

DY = demonstration year; SUD = substance use disorder; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.18. Impacts on Medicaid costs for inpatient hospitalizations by subgroup: Oklahoma

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
All-cause hospitalization costs per beneficiary per month (PBPM)					
Children and adolescents[a]					
Baseline year	144	126			
Months 1-12	158	115	24 (16)	18%	0.13
Months 13-24	118	74	25 (17)	31%	0.15
Cumulative (months 1-24)	142	100	23 (13)	20%	0.09
Adults[a]					
Baseline year	185	201			
Months 1-12	164	223	-44 (21)*	-21%	0.04
Months 13-24	154	228	-59 (24)*	-28%	0.02
Cumulative (months 1-24)	159	224	-49 (18)**	-24%	<0.01
Beneficiaries with SUD[b]					
Baseline year	318	325			
Months 1-12	262	305	-36 (45)	-12%	0.43
Months 13-24	225	296	-64 (49)	-24%	0.19
Cumulative (months 1-24)	244	301	-49 (39)	-17%	0.20
Beneficiaries with a first visit in DY1[c]					
Baseline year	157	156			
Months 1-12	167	179	-13 (18)	-7.3%	0.46
Months 13-24	136	158	-23 (20)	-14%	0.27
Cumulative (months 1-24)	152	168	-16 (16)	-9.6%	0.29
Beneficiaries with a first visit in DY2[c]					
Baseline year	158	163			
Months 1-12	153	167	-9.0 (29)	-5.5%	0.76
Months 13-24	124	127	1.6 (27)	1.5%	0.95
Cumulative (months 1-24)	137	149	-6.2 (25)	-4.4%	0.80
Beneficiaries with a first visit in DY3[c]					
Baseline year	142	135			
Months 1-12	142	133	1.7 (24)	1.3%	0.94
Months 13-24	94	74	12 (27)	15%	0.64
Cumulative (months 1-24)	123	108	7.2 (22)	6.3%	0.74
Beneficiaries with a first visit in DY4[c]					
Baseline year	192	151			
Months 1-12	179	87	52 (40)	41%	0.20
Behavioral health-related hospitalization costs PBPM[d]					
Children and adolescents[a]					
Baseline year	136	117			

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 1-12	146	106	21 (15)	17%	0.14
Months 13-24	99	65	15 (15)	20%	0.31
Cumulative (months 1-24)	128	91	18 (12)	17%	0.15
Adults[a]					
Baseline year	143	151			
Months 1-12	125	156	-23 (16)	-16%	0.16
Months 13-24	106	145	-31 (17)	-23%	0.07
Cumulative (months 1-24)	117	152	-27 (14)	-19%	0.06
Beneficiaries with SUD[b]					
Baseline year	279	277			
Months 1-12	205	246	-43 (36)	-17%	0.23
Months 13-24	176	228	-54 (41)	-25%	0.19
Cumulative (months 1-24)	192	241	-50 (31)	-21%	0.11
Beneficiaries with a first visit in DY1[c]					
Baseline year	137	137			
Months 1-12	144	143	1.5 (15)	1.0%	0.92
Months 13-24	102	115	-13 (16)	-11%	0.42
Cumulative (months 1-24)	125	130	-5.0 (13)	-3.8%	0.70
Beneficiaries with a first visit in DY2[c]					
Baseline year	135	129			
Months 1-12	137	130	-0.12 (27)	<1%	1.00
Months 13-24	104	91	6.5 (23)	7.7%	0.78
Cumulative (months 1-24)	120	112	0.73 (23)	<1%	0.97
Beneficiaries with a first visit in DY3[c]					
Baseline year	128	111			
Months 1-12	125	111	-2.3 (23)	-1.8%	0.92
Months 13-24	80	59	4.6 (26)	6.0%	0.86
Cumulative (months 1-24)	108	90	0.70 (20)	<1%	0.97
Beneficiaries with a first visit in DY4[c]					
Baseline year	163	132			
Months 1-12	145	76	38 (32)	36%	0.23
Physical health-related hospitalization costs PBPM[d]					
Children and adolescents[a]					
Baseline year	8.3	8.6			
Months 1-12	11	9.1	2.3 (5.8)	26%	0.69
Months 13-24	19	9.7	9.4 (7.5)	203%	0.21
Cumulative (months 1-24)	14	9.2	4.9 (5.0)	65%	0.32
Adults[a]					
Baseline year	42	50			

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 1-12	39	67	-21 (12)	-35%	0.08
Months 13-24	48	83	-28 (17)	-37%	0.11
Cumulative (months 1-24)	42	72	-22 (11)*	-34%	0.04
Beneficiaries with SUD[b]					
Baseline year	39	48			
Months 1-12	57	59	6.9 (25)	14%	0.78
Months 13-24	49	68	-9.8 (25)	-19%	0.69
Cumulative (months 1-24)	52	61	1.2 (21)	2.4%	0.96
Beneficiaries with a first visit in DY1[c]					
Baseline year	20	19			
Months 1-12	22	36	-15 (8.2)	-40%	0.07
Months 13-24	34	43	-9.8 (12)	-23%	0.42
Cumulative (months 1-24)	27	38	-11 (7.7)	-30%	0.14
Beneficiaries with a first visit in DY2[c]					
Baseline year	22	34			
Months 1-12	16	37	-8.9 (10)	-36%	0.40
Months 13-24	20	37	-4.8 (14)	-19%	0.73
Cumulative (months 1-24)	17	36	-7.0 (10)	-28%	0.49
Beneficiaries with a first visit in DY3[c]					
Baseline year	14	24			
Months 1-12	16	22	4.0 (7.2)	34%	0.58
Months 13-24	14	15	7.9 (7.9)	139%	0.31
Cumulative (months 1-24)	15	18	6.5 (6.3)	78%	0.30
Beneficiaries with a first visit in DY4[c]					
Baseline year	29	19			
Months 1-12	34	11	13 (23)	75%	0.56

Source: Mathematica analyses of Oklahoma TAF data, 2015 – 2021.

Note: We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] We defined the children/adolescents and adult subgroups based on age at the first visit date. We categorized beneficiaries as children/adolescents if they were under the age of 19 and adults if they were age 19 or older.

[b] We identified the presence of SUD based on relevant diagnosis codes in the 24 months before enrollment, the maximum amount of baseline TAF data available for beneficiaries with enrollment dates at the start of the demonstration, and in the 30 days following the first visit date (to identify beneficiaries newly seeking care for SUD).

[c] The CCBHC demonstration started in Oklahoma on April 1, 2017. Demonstration year 1 spans April 1, 2017 to March 31, 2018; demonstration year 2 spans April 1, 2018 to March 31, 2019; demonstration year 3 spans April 1, 2019 to March 31, 2020; demonstration year 4 spans April 1, 2020 to March 31, 2021, but the demonstration year 4 cohort includes only those beneficiaries with a first visit date between April 1, 2020 and December 31, 2020, due to data availability. We also only have a maximum of one year of follow-up data for beneficiaries in cohort 4 because TAF data were only available through December 31, 2021.

[d] We identified stays and visit as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health related. For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

DY = demonstration year; SUD = substance use disorder; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.19. Impacts on Medicaid costs for emergency department visits by subgroup: Oklahoma

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
All-cause ED costs per beneficiary per month (PBPM)					
Children and adolescents[a]					
Baseline year	21	21			
Months 1-12	21	20	0.77 (1.2)	3.8%	0.54
Months 13-24	22	19	2.4 (1.1)*	13%	0.04
Cumulative (months 1-24)	21	20	1.4 (0.96)	7.0%	0.15
Adults[a]					
Baseline year	85	93			
Months 1-12	84	91	0.91 (3.6)	1.1%	0.80
Months 13-24	76	92	-7.5 (5.3)	-9.1%	0.16
Cumulative (months 1-24)	81	91	-2.4 (3.7)	-3.0%	0.51
Beneficiaries with SUD[b]					
Baseline year	100	113			
Months 1-12	93	110	-4.0 (6.3)	-4.2%	0.52
Months 13-24	83	107	-11 (7.5)	-12%	0.15
Cumulative (months 1-24)	89	109	-7.1 (5.9)	-7.7%	0.22
Beneficiaries with a first visit in DY1[c]					
Baseline year	45	49			
Months 1-12	46	52	-1.2 (2.4)	-2.6%	0.62
Months 13-24	45	52	-2.3 (2.4)	-5.0%	0.34
Cumulative (months 1-24)	45	52	-1.7 (2.0)	-3.7%	0.41
Beneficiaries with a first visit in DY2[c]					
Baseline year	43	39			
Months 1-12	47	44	-1.2 (2.9)	-2.5%	0.68
Months 13-24	43	45	-6.0 (5.3)	-13%	0.26
Cumulative (months 1-24)	45	44	-3.7 (3.5)	-7.8%	0.29
Beneficiaries with a first visit in DY3[c]					
Baseline year	40	49			
Months 1-12	42	46	5.5 (3.2)	16%	0.09
Months 13-24	27	29	6.4 (3.5)	35%	0.07
Cumulative (months 1-24)	36	38	7.1 (2.8)*	26%	0.01
Beneficiaries with a first visit in DY4[c]					
Baseline year	47	44			
Months 1-12	35	31	0.65 (4.2)	1.9%	0.88
Behavioral health-related ED costs PBPM[d]					
Children and adolescents[a]					
Baseline year	3.5	3.2			

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 1-12	3.5	3.1	0.11 (0.38)	3.3%	0.77
Months 13-24	4.3	3.1	0.87 (0.42)*	32%	0.04
Cumulative (months 1-24)	3.8	3.0	0.42 (0.34)	13%	0.21
Adults[a]					
Baseline year	21	20			
Months 1-12	21	20	0.34 (1.5)	1.7%	0.83
Months 13-24	19	19	-0.10 (1.9)	<1%	0.96
Cumulative (months 1-24)	20	19	0.02 (1.4)	<1%	0.99
Beneficiaries with SUD[b]					
Baseline year	29	32			
Months 1-12	27	31	0.17 (2.9)	<1%	0.95
Months 13-24	25	27	1.1 (3.4)	5.1%	0.76
Cumulative (months 1-24)	26	29	0.17 (2.6)	<1%	0.95
Beneficiaries with a first visit in DY1[c]					
Baseline year	9.6	9.5			
Months 1-12	9.9	9.8	-0.11 (0.77)	-1.1%	0.89
Months 13-24	11	10	0.33 (1.0)	3.6%	0.74
Cumulative (months 1-24)	10	10	0.02 (0.77)	<1%	0.98
Beneficiaries with a first visit in DY2[c]					
Baseline year	9.6	7.6			
Months 1-12	11	8.2	0.88 (1.2)	8.8%	0.45
Months 13-24	9.8	7.6	0.23 (1.2)	2.8%	0.84
Cumulative (months 1-24)	10	7.9	0.51 (1.0)	5.4%	0.62
Beneficiaries with a first visit in DY3[c]					
Baseline year	9.0	9.4			
Months 1-12	8.9	10	-0.85 (1.5)	-8.8%	0.57
Months 13-24	5.1	4.7	0.68 (1.6)	15%	0.66
Cumulative (months 1-24)	7.5	7.7	0.12 (1.1)	1.7%	0.91
Beneficiaries with a first visit in DY4[c]					
Baseline year	11	11			
Months 1-12	8.3	6.8	0.98 (2.1)	13%	0.63
Physical health-related ED costs PBPM[d]					
Children and adolescents[a]					
Baseline year	17	17			
Months 1-12	18	17	0.66 (1.2)	3.8%	0.57
Months 13-24	18	16	1.5 (1.0)	10%	0.13
Cumulative (months 1-24)	18	17	0.96 (0.87)	5.8%	0.27
Adults[a]					
Baseline year	64	73			

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Months 1-12	63	71	0.57 (3.0)	<1%	0.85
Months 13-24	57	73	-7.4 (4.7)	-12%	0.12
Cumulative (months 1-24)	61	72	-2.5 (3.2)	-4.0%	0.43
Beneficiaries with SUD[b]					
Baseline year	71	81			
Months 1-12	65	79	-4.2 (5.1)	-6.1%	0.41
Months 13-24	58	80	-12 (6.0)*	-18%	0.05
Cumulative (months 1-24)	62	79	-7.3 (4.7)	-11%	0.12
Beneficiaries with a first visit in DY1[c]					
Baseline year	35	40			
Months 1-12	36	42	-1.1 (2.2)	-3.0%	0.62
Months 13-24	35	42	-2.6 (2.0)	-7.2%	0.19
Cumulative (months 1-24)	35	42	-1.7 (1.8)	-4.7%	0.34
Beneficiaries with a first visit in DY2[c]					
Baseline year	34	31			
Months 1-12	36	36	-2.1 (2.5)	-5.6%	0.40
Months 13-24	33	37	-6.2 (5.0)	-16%	0.21
Cumulative (months 1-24)	35	36	-4.2 (3.2)	-11%	0.18
Beneficiaries with a first visit in DY3[c]					
Baseline year	31	39			
Months 1-12	34	36	6.3 (2.5)*	25%	0.01
Months 13-24	22	24	5.7 (2.7)*	41%	0.04
Cumulative (months 1-24)	29	30	7.0 (2.3)**	35%	<0.01
Beneficiaries with a first visit in DY4[c]					
Baseline year	36	33			
Months 1-12	26	24	-0.33 (3.5)	-1.3%	0.93

Source: Mathematica analyses of Oklahoma TAF data, 2015 – 2021.

Note: We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] We defined the children/adolescents and adult subgroups based on age at the first visit date. We categorized beneficiaries as children/adolescents if they were under the age of 19 and adults if they were age 19 or older.

[b] We identified the presence of SUD based on relevant diagnosis codes in the 24 months before enrollment, the maximum amount of baseline TAF data available for beneficiaries with enrollment dates at the start of the demonstration, and in the 30 days following the first visit date (to identify beneficiaries newly seeking care for SUD).

[c] The CCBHC demonstration started in Oklahoma on April 1, 2017. Demonstration year 1 spans April 1, 2017 to March 31, 2018; demonstration year 2 spans April 1, 2018 to March 31, 2019; demonstration year 3 spans April 1, 2019 to March 31, 2020; demonstration year 4 spans April 1, 2020 to March 31, 2021, but the demonstration year 4 cohort includes only those beneficiaries with a first visit date between April 1, 2020 and December 31, 2020, due to data availability. We also only have a maximum of one year of follow-up data for beneficiaries in cohort 4 because TAF data were only available through December 31, 2021.

[d] We identified stays and visit as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health related. For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

DY = demonstration year; ED = emergency department; SUD = substance use disorder; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.20. Impacts on Medicaid costs for ambulatory visits by subgroup: Oklahoma

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
All-cause ambulatory costs per beneficiary per month (PBPM)					
Children and adolescents[a]					
Baseline year	245	220			
Months 1-12	705	363	317 (8.0)***	82%	<0.01
Months 13-24	378	260	94 (9.2)***	30%	<0.01
Cumulative (months 1-24)	580	325	230 (7.5)***	66%	<0.01
Adults[a]					
Baseline year	232	209			
Months 1-12	535	294	217 (9.0)***	69%	<0.01
Months 13-24	364	238	103 (12)***	35%	<0.01
Cumulative (months 1-24)	469	275	171 (8.6)***	56%	<0.01
Beneficiaries with SUD[b]					
Baseline year	326	260			
Months 1-12	606	308	231 (16)***	61%	<0.01
Months 13-24	396	239	91 (18)***	25%	<0.01
Cumulative (months 1-24)	526	283	176 (15)***	47%	<0.01
Beneficiaries with a first visit in DY1[c]					
Baseline year	323	253			
Months 1-12	745	346	329 (9.3)***	79%	<0.01
Months 13-24	447	273	103 (9.7)***	29%	<0.01
Cumulative (months 1-24)	611	314	227 (8.4)***	59%	<0.01
Beneficiaries with a first visit in DY2[c]					
Baseline year	169	195			
Months 1-12	584	356	254 (13)***	77%	<0.01
Months 13-24	342	276	92 (16)***	36%	<0.01
Cumulative (months 1-24)	475	324	177 (13)***	59%	<0.01
Beneficiaries with a first visit in DY3[c]					
Baseline year	173	188			
Months 1-12	559	327	247 (13)***	80%	<0.01
Months 13-24	309	215	109 (16)***	55%	<0.01
Cumulative (months 1-24)	464	284	194 (12)***	74%	<0.01

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Beneficiaries with a first visit in DY4[c]					
Baseline year	178	174			
Months 1-12	547	316	227 (20)***	72%	<0.01
Behavioral health-related ambulatory costs PBPM[d]					
Children and adolescents[a]					
Baseline year	163	135			
Months 1-12	593	265	301 (7.5)***	104%	<0.01
Months 13-24	303	183	93 (8.3)***	39%	<0.01
Cumulative (months 1-24)	482	235	220 (6.9)***	84%	<0.01
Adults[a]					
Baseline year	152	115			
Months 1-12	430	189	204 (6.7)***	90%	<0.01
Months 13-24	279	139	103 (8.1)***	51%	<0.01
Cumulative (months 1-24)	372	171	164 (6.5)***	76%	<0.01
Beneficiaries with SUD[b]					
Baseline year	256	162			
Months 1-12	516	214	208 (14)***	67%	<0.01
Months 13-24	327	151	82 (15)***	27%	<0.01
Cumulative (months 1-24)	445	191	159 (13)***	52%	<0.01
Beneficiaries with a first visit in DY1[c]					
Baseline year	239	164			
Months 1-12	644	251	318 (8.4)***	97%	<0.01
Months 13-24	365	184	105 (8.4)***	39%	<0.01
Cumulative (months 1-24)	519	222	222 (7.5)***	74%	<0.01
Beneficiaries with a first visit in DY2[c]					
Baseline year	88	98			
Months 1-12	462	243	231 (11)***	100%	<0.01
Months 13-24	260	186	85 (13)***	48%	<0.01
Cumulative (months 1-24)	372	221	161 (11)***	77%	<0.01
Beneficiaries with a first visit in DY3[c]					
Baseline year	95	100			
Months 1-12	444	221	229 (11)***	107%	<0.01
Months 13-24	243	142	107 (13)***	77%	<0.01
Cumulative (months 1-24)	369	193	181 (11)***	100%	<0.01

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Beneficiaries with a first visit in DY4[c]					
Baseline year	101	100			
Months 1-12	435	218	216 (17)***	100%	<0.01
Physical health-related ambulatory costs PBPM[d]					
Children and adolescents[a]					
Baseline year	82	85			
Months 1-12	112	99	17 (2.8)***	17%	<0.01
Months 13-24	76	77	1.5 (3.5)	2.0%	0.68
Cumulative (months 1-24)	97	90	10 (2.8)***	12%	<0.01
Adults[a]					
Baseline year	80	94			
Months 1-12	105	106	13 (5.9)*	14%	0.03
Months 13-24	85	99	-0.30 (8.0)	<1%	0.97
Cumulative (months 1-24)	96	103	6.8 (5.4)	7.5%	0.21
Beneficiaries with SUD[b]					
Baseline year	70	98			
Months 1-12	90	95	23 (7.2)**	35%	<0.01
Months 13-24	69	88	9.1 (9.2)	14%	0.32
Cumulative (months 1-24)	81	93	17 (7.1)*	25%	0.02
Beneficiaries with a first visit in DY1[c]					
Baseline year	85	89			
Months 1-12	101	94	11 (4.0)**	13%	<0.01
Months 13-24	82	89	-2.0 (4.6)	-2.5%	0.66
Cumulative (months 1-24)	92	92	4.7 (3.7)	5.4%	0.20
Beneficiaries with a first visit in DY2[c]					
Baseline year	81	96			
Months 1-12	121	114	23 (6.0)***	23%	<0.01
Months 13-24	81	90	6.9 (9.1)	8.8%	0.45
Cumulative (months 1-24)	103	102	16 (6.1)**	18%	<0.01
Beneficiaries with a first visit in DY3[c]					
Baseline year	79	88			
Months 1-12	115	106	18 (6.3)**	19%	<0.01
Months 13-24	65	73	2.1 (7.5)	3.4%	0.78
Cumulative (months 1-24)	94	91	13 (6.0)*	16%	0.03

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Beneficiaries with a first visit in DY4[c]					
Baseline year	77	74			
Months 1-12	112	98	11 (8.6)	11%	0.20

Source: Mathematica analyses of Oklahoma TAF data, 2015 – 2021.

Note: We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] We defined the children/adolescents and adult subgroups based on age at the first visit date. We categorized beneficiaries as children/adolescents if they were under the age of 19 and adults if they were age 19 or older.

[b] We identified the presence of SUD based on relevant diagnosis codes in the 24 months before enrollment, the maximum amount of baseline TAF data available for beneficiaries with enrollment dates at the start of the demonstration, and in the 30 days following the first visit date (to identify beneficiaries newly seeking care for SUD).

[c] The CCBHC demonstration started in Oklahoma on April 1, 2017. Demonstration year 1 spans April 1, 2017 to March 31, 2018; demonstration year 2 spans April 1, 2018 to March 31, 2019; demonstration year 3 spans April 1, 2019 to March 31, 2020; demonstration year 4 spans April 1, 2020 to March 31, 2021, but the demonstration year 4 cohort includes only those beneficiaries with a first visit date between April 1, 2020 and December 31, 2020, due to data availability. We also only have a maximum of one year of follow-up data for beneficiaries in cohort 4 because TAF data were only available through December 31, 2021.

[d] We identified stays and visit as behavioral health-related if any diagnosis code on the underlying claim(s) was for a behavioral health condition. All other stays and visits were classified as physical health related. For more information on measure construction, see Appendix A, Section IV.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

DY = demonstration year; SUD = substance use disorder; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.21. Impacts on quality measures by demonstration year of first visit: Minnesota

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Follow-up After Hospitalization for Mental Illness (FUH-AD and FUH-CH)					
7-day					
Beneficiaries with a first visit in DY1[a]					
Baseline year	44	41			
Months 1-12	45	47	-6.2 (3.6)	-12%	0.09
Months 13-24	43	43	-3.4 (4.1)	-7.3%	0.40
Cumulative (months 1-24)	44	45	-5.1 (3.2)	-10%	0.12
Beneficiaries with a first visit in DY2[a]					
Baseline year	33	36			
Months 1-12	44	42	6.0 (5.4)	16%	0.26
Months 13-24	41	39	5.2 (5.8)	15%	0.37
Cumulative (months 1-24)	43	41	5.7 (4.7)	15%	0.22
Beneficiaries with a first visit in DY3[a]					
Baseline year	31	38			
Months 1-12	43	39	12 (6.8)	36%	0.09
Months 13-24	49	48	7.6 (8.9)	19%	0.39
Cumulative (months 1-24)	45	42	10 (6.3)	30%	0.11
Beneficiaries with a first visit in DY4[a]					
Baseline year	37	37			
Months 1-12	36	34	1.9 (12)	5.7%	0.87
30-day					
Beneficiaries with a first visit in DY1[a]					
Baseline year	72	69			
Months 1-12	71	75	-6.4 (3.3)	-8.2%	0.05
Months 13-24	71	68	0.57 (3.7)	<1%	0.88
Cumulative (months 1-24)	71	72	-3.5 (2.9)	-4.7%	0.22
Beneficiaries with a first visit in DY2[a]					
Baseline year	58	59			
Months 1-12	68	64	4.1 (5.5)	6.5%	0.45
Months 13-24	70	69	1.3 (6.0)	1.9%	0.83
Cumulative (months 1-24)	69	66	3.3 (4.8)	5.1%	0.49
Beneficiaries with a first visit in DY3[a]					
Baseline year	63	65			
Months 1-12	65	70	-3.8 (6.8)	-5.5%	0.58
Months 13-24	67	75	-6.4 (8.6)	-8.7%	0.46
Cumulative (months 1-24)	66	72	-4.4 (6.3)	-6.3%	0.48

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Beneficiaries with a first visit in DY4[a]					
Baseline year	72	62			
Months 1-12	70	71	-12 (11)	-14%	0.27
Follow-up After Emergency Department Visit for Mental Illness (FUM-AD and FUA-CH)					
7-day					
Beneficiaries with a first visit in DY1[a]					
Baseline year	58	59			
Months 1-12	68	60	8.7 (3.8)*	15%	0.02
Months 13-24	55	54	2.6 (4.4)	5.0%	0.54
Cumulative (months 1-24)	62	58	6.2 (3.5)	11%	0.07
Beneficiaries with a first visit in DY2[a]					
Baseline year	41	51			
Months 1-12	60	65	5.7 (5.4)	10%	0.29
Months 13-24	55	54	11 (6.8)	24%	0.12
Cumulative (months 1-24)	58	61	7.0 (5.2)	14%	0.18
Beneficiaries with a first visit in DY3[a]					
Baseline year	40	35			
Months 1-12	61	67	-11 (6.5)	-15%	0.11
Months 13-24	53	68	-20 (10)	-27%	0.05
Cumulative (months 1-24)	59	67	-13 (6.4)*	-18%	0.05
Beneficiaries with a first visit in DY4[a]					
Baseline year	44	50			
Months 1-12	65	56	15 (14)	29%	0.31
30-day					
Beneficiaries with a first visit in DY1[a]					
Baseline year	72	73			
Months 1-12	79	77	4.0 (3.4)	5.3%	0.24
Months 13-24	74	71	4.0 (3.9)	5.7%	0.31
Cumulative (months 1-24)	77	75	4.0 (3.1)	5.4%	0.20
Beneficiaries with a first visit in DY2[a]					
Baseline year	56	64			
Months 1-12	73	77	4.6 (5.3)	6.7%	0.39
Months 13-24	70	71	6.9 (6.7)	11%	0.30
Cumulative (months 1-24)	72	75	5.3 (5.2)	8.0%	0.30
Beneficiaries with a first visit in DY3[a]					
Baseline year	62	53			
Months 1-12	74	78	-14 (6.2)*	-16%	0.03
Months 13-24	71	80	-17 (9.1)	-19%	0.06
Cumulative (months 1-24)	73	79	-15 (6.1)*	-17%	0.02

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Beneficiaries with a first visit in DY4[a]					
Baseline year	62	69			
Months 1-12	75	74	7.7 (13)	11%	0.57
Follow-up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (FUA-AD and FUA-CH)					
7-day					
Beneficiaries with a first visit in DY1[a]					
Baseline year	34	33			
Months 1-12	41	32	7.3 (4.5)	22%	0.10
Months 13-24	36	38	-3.2 (5.0)	-8.0%	0.53
Cumulative (months 1-24)	39	35	2.8 (3.9)	7.6%	0.48
Beneficiaries with a first visit in DY2[a]					
Baseline year	32	35			
Months 1-12	41	41	2.0 (6.5)	5.3%	0.75
Months 13-24	39	46	-4.4 (7.2)	-10%	0.54
Cumulative (months 1-24)	40	43	-0.31 (5.7)	<1%	0.96
Beneficiaries with a first visit in DY3[a]					
Baseline year	38	38			
Months 1-12	38	46	-8.7 (7.9)	-19%	0.27
Months 13-24	45	45	-0.79 (8.7)	-1.7%	0.93
Cumulative (months 1-24)	40	46	-5.8 (7.0)	-13%	0.40
Beneficiaries with a first visit in DY4[a]					
Baseline year	31	52			
Months 1-12	48	38	30 (14)*	168%	0.03
30-day					
Beneficiaries with a first visit in DY1[a]					
Baseline year	50	49			
Months 1-12	56	47	7.1 (4.8)	15%	0.14
Months 13-24	50	53	-3.9 (5.0)	-7.3%	0.43
Cumulative (months 1-24)	53	50	2.3 (4.1)	4.6%	0.57
Beneficiaries with a first visit in DY2[a]					
Baseline year	46	53			
Months 1-12	61	60	7.5 (6.3)	14%	0.24
Months 13-24	56	61	1.7 (7.3)	3.1%	0.82
Cumulative (months 1-24)	59	60	5.3 (5.8)	9.9%	0.36
Beneficiaries with a first visit in DY3[a]					
Baseline year	54	53			
Months 1-12	55	58	-4.0 (7.7)	-6.8%	0.60
Months 13-24	60	60	-1.7 (8.9)	-2.8%	0.85

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Cumulative (months 1-24)	57	59	-3.3 (7.0)	-5.4%	0.64
Beneficiaries with a first visit in DY4[a]					
Baseline year	50	63			
Months 1-12	67	52	28 (13)*	70%	0.03
Adherence to Antipsychotic Medications for Individuals with Schizophrenia (SAA)					
Beneficiaries with a first visit in DY1[a]					
Baseline year	67	69			
Months 1-12	65	64	1.4 (3.5)	2.2%	0.70
Months 13-24	69	64	6.6 (3.9)	10%	0.09
Cumulative (months 1-24)	67	64	3.8 (3.2)	5.9%	0.24
Beneficiaries with a first visit in DY2[a]					
Baseline year	54	63			
Months 1-12	46	55	-0.42 (7.3)	<1%	0.95
Months 13-24	59	61	7.3 (7.9)	14%	0.35
Cumulative (months 1-24)	52	58	3.6 (6.7)	7.3%	0.60
Beneficiaries with a first visit in DY3[a]					
Baseline year	53	52			
Months 1-12	52	59	-8.8 (8.3)	-15%	0.29
Months 13-24	57	61	-4.8 (11)	-7.7%	0.66
Cumulative (months 1-24)	53	60	-7.5 (7.9)	-12%	0.35
Beneficiaries with a first visit in DY4[a]					
Baseline year	49	36			
Months 1-12	56	59	-16 (18)	-23%	0.36
Antidepressant Medication Management (AMM)[b]					
Acute phase					
Beneficiaries with a first visit in DY1[a]	44	43	0.77 (2.7)	1.8%	0.77
Beneficiaries with a first visit in DY2[a]	40	43	-2.5 (3.8)	-5.9%	0.51
Beneficiaries with a first visit in DY3[a]	42	45	-2.3 (4.4)	-5.2%	0.60
Beneficiaries with a first visit in DY4[a]	46	51	-4.8 (7.5)	-9.3%	0.53
Continuation phase					
Beneficiaries with a first visit in DY1[a]	26	24	2.1 (2.3)	8.8%	0.36
Beneficiaries with a first visit in DY2[a]	25	27	-2.4 (3.4)	-8.7%	0.49
Beneficiaries with a first visit in DY3[a]	23	28	-4.6 (3.7)	-16%	0.22

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Beneficiaries with a first visit in DY4[a]	22	35	-13 (6.4)*	-38%	0.04

Source: Mathematica analyses of Minnesota TAF data, 2016 – 2021.

Note: We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] The CCBHC demonstration started in Minnesota on July 1, 2017. Demonstration year 1 spans July 1, 2017 to June 30, 2018; demonstration year 2 spans July 1, 2018 to June 30, 2019; demonstration year 3 spans July 1, 2019 to June 30, 2020; demonstration year 4 spans July 1, 2020 to June 30, 2021, but the demonstration year 4 cohort includes only those beneficiaries with a first visit date between July 1, 2020 and December 31, 2020, due to data availability. We also only have a maximum of one year of follow-up data for beneficiaries in cohort 4 because TAF data were only available through December 31, 2021.

[b] We were unable to calculate the measure annually; the measure's long window to identify beneficiaries eligible for inclusion in the measure required lookback into the prior year and the look-forward potentially extended into the next year, making it impossible to report on an annual basis. For this reason, we calculated the measure once for the demonstration period, with the intake period set as the first year starting on the demonstration enrollment date for each beneficiary who qualified for the measure.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

AD = adult; CH = child; DY = demonstration year; ED = emergency department; SE = standard error; TAF = T-MSIS analytic files

Appendix Exhibit A.VII.22. Impacts on quality measures by demonstration year of first visit: Oklahoma

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percentage impact	*p*-value
Adherence to Antipsychotic Medications for Individuals with Schizophrenia (SAA)					
Beneficiaries with a first visit in DY1[a]					
Baseline year	67	64			
Months 1-12	61	56	2.0 (4.3)	3.3%	0.64
Months 13-24	64	65	-4.4 (5.0)	-6.5%	0.38
Cumulative (months 1-24)	62	60	-0.84 (4.1)	-1.3%	0.84
Beneficiaries with a first visit in DY2[a]					
Baseline year	57	71			
Months 1-12	48	60	2.4 (14)	5.4%	0.86
Months 13-24	48	61	1.9 (14)	4.1%	0.90
Cumulative (months 1-24)	48	60	2.7 (13)	5.9%	0.84
Beneficiaries with a first visit in DY3[a]					
Baseline year	54	37			
Months 1-12	48	37	-5.9 (12)	-11%	0.62
Months 13-24	32	36	-20 (16)	-39%	0.22
Cumulative (months 1-24)	43	36	-9.7 (11)	-18%	0.38
Beneficiaries with a first visit in DY4[a]					
Baseline year	48	71			
Months 1-12	39	49	13 (22)	49%	0.56
Antidepressant Medication Management (AMM)[b]					
Acute phase					
Beneficiaries with a first visit in DY1[a]	38	32	6.2 (4.0)	19%	0.13
Beneficiaries with a first visit in DY2[a]	52	45	6.7 (6.3)	15%	0.29
Beneficiaries with a first visit in DY3[a]	44	41	3.4 (7.3)	8.5%	0.64
Beneficiaries with a first visit in DY4[a]	38	23	14 (9.6)	63%	0.13
Continuation phase					
Beneficiaries with a first visit in DY1[a]	19	14	5.0 (3.1)	36%	0.11
Beneficiaries with a first visit in DY2[a]	29	23	6.5 (5.7)	28%	0.26
Beneficiaries with a first visit in DY3[a]	22	20	2.5 (6.2)	13%	0.68
Beneficiaries with a first visit in DY4[a]	16	14	1.7 (6.8)	12%	0.81

Source: Mathematica analyses of Oklahoma TAF data, 2015 – 2021.

Note: We defined the baseline and 24-month follow-up periods relative to each beneficiary's first visit date.

[a] The CCBHC demonstration started in Oklahoma on April 1, 2017. Demonstration year 1 spans April 1, 2017 to March 31, 2018; demonstration year 2 spans April 1, 2018 to March 31, 2019; demonstration year 3 spans April 1, 2019 to March 31, 2020; demonstration year 4 spans April 1, 2020 to March 31, 2021, but the demonstration year 4 cohort includes only those beneficiaries with a first visit date between April 1, 2020 and December 31, 2020, due to data availability. We also only have a maximum of one year of follow-up data for beneficiaries in cohort 4 because TAF data were only available through December 31, 2021.

[b] We were unable to calculate the measure annually; the measure's long window to identify beneficiaries eligible for inclusion in the measure required lookback into the prior year and the look-forward potentially extended into the next year, making it impossible to report on an annual basis. For this reason, we calculated the measure once for the demonstration period, with the intake period set as the first year starting on the demonstration enrollment date for each beneficiary who qualified for the measure.

* Significantly different from zero at the .05 level, two-tailed test.

** Significantly different from zero at the .01 level, two-tailed test.

*** Significantly different from zero at the .001 level, two-tailed test.

DY = demonstration year; SE = standard error; TAF = T-MSIS analytic files

Appendix B. Supplementary descriptive tables of CCBHC beneficiaries by demonstration year of first visit

This appendix presents detailed findings on the characteristics of CCBHC clients included in the impact analysis using Medicaid claims data relative to the full population of Medicaid beneficiaries served by the CCBHCs in Minnesota, Nevada, and Oklahoma. The analytic population is smaller than the full population of Medicaid beneficiaries who received care from CCBHCs due to the exclusions described in Appendix A. We compared the distribution of demographic- and eligibility-related characteristics of all beneficiaries who received services from a CCBHC during the demonstration period versus the subset included in the analysis population. Consistent with the presentation of findings in Appendix A, Section VII, the tables in this appendix report findings by the demonstration year corresponding to the year of the beneficiary's first visit to a CCBHC.

In all three states, with a few exceptions, the analysis population reflected the characteristics of the broader population of Medicaid beneficiaries who received services from the CCBHCs, indicating that the exclusion criteria for the analyses did not greatly change the representativeness of the analysis population.

- In Minnesota and Oklahoma, beneficiaries in the analysis population in each year were younger, on average, and more likely to be in the child eligibility category (and conversely less likely to be eligible for Medicaid because of a disability) than the full population of Medicaid beneficiaries served by CCBHCs (Appendix Exhibits B.1 and B.3). This was not wholly unexpected: beneficiaries dually eligible for Medicare and Medicaid, who fall in the adult or aged Medicaid categories and who have relatively high rates of disability, were excluded from the analysis population. In contrast, the average age and distribution of beneficiaries across child and disability eligibility categories was similar between the full population and the subset included in impact analyses in all years in Nevada, indicating that Nevada CCBHCs primarily served adults (Appendix Exhibit B.2).
- In Oklahoma, in all demonstration years, beneficiaries included in the impact analyses were less likely to be non-Hispanic White (and conversely, slightly more likely to be Hispanic or fall into the "other races and ethnicities" group) and more likely to be enrolled in a primary care case management program.
- In Minnesota, in all demonstration years, beneficiaries in the impact analysis population were more likely to be enrolled in comprehensive managed care plans relative to the full population who received care from CCBHCs (Appendix Exhibit B.1).

Appendix Exhibit B.1. Characteristics of Medicaid beneficiaries served by CCBHCs in Minnesota

	First visit to a CCBHC in Demonstration Year 1 (July 1, 2017, to June 30, 2018)		First visit to a CCBHC in Demonstration Year 2 (July 1, 2018, to June 30, 2019)		First visit to a CCBHC in Demonstration Year 3 (July 1, 2019, to June 30, 2020)		First visit to a CCHC in Demonstration Year 4 (July 1, 2020, to December 31, 2020)	
	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]
Sample size	11,770	7,599	5,134	3,266	3,662	2,206	1,655	1,098
Demographic and eligibility characteristics at first visit (percentage unless otherwise noted)								
Age, mean (SD)	33 (18)	29 (17)	30 (17)	27 (16)	30 (17)	28 (17)	30 (16)	28 (15)
Age category								
18 and younger	31	38	33	38	30	35	28	33
19 to 34	23	25	29	29	32	31	35	34
35 to 49	23	22	22	21	23	21	24	22
50 and older	23	15	16	12	15	13	14	11
Male	48	49	50	49	51	50	51	50
Race and ethnicity								
Non-Hispanic White	65	61	63	60	60	59	59	58
Non-Hispanic Black	16	18	17	18	19	21	18	20
Hispanic	5	6	6	7	6	6	7	7
Other races and ethnicities	11	13	11	13	11	12	9.4	11
Unknown race and ethnicity	2	2	2	2	4	2	6	4
Characteristic of beneficiary's zip code								
Large metro area	50	51	44	45	44	47	38	40
Small metro area	20	18	23	22	27	25	32	29
Non-metro, urban area	22	23	24	24	20	19	21	22
Non-metro, rural area	8	8	9	9	9	9	9	9

Medicaid eligibility status at enrollment								
Pregnant	1	1	1	1	1	1	1	DS
Child	31	38	35	40	32	37	31	35
Adult, non-expansion	11	14	16	18	17	18	18	19
Disabled	29	16	16	8.9	15	8.7	12	6.9
Aged	3	<1	2	<1.0	2	<1.0	2	<1.0
Adult expansion	24	30	30	33	33	36	36	38
Enrolled in a comprehensive managed care plan	60	86	67	92	67	92	72	93
Enrolled in an HCBS waiver or program	4	6	2	3	3	4	2	3
Enrollment-related exclusion criteria[c]								
Dually eligible for Medicare and Medicaid	21	0	12	0	11	0	9	0
Not eligible for Medicaid or CHIP	<1	0	4	0	3	0	2	0
Had restricted benefits	<1	0	4	0	4	0	2	0
Had less than six months of Medicaid data in the baseline period	33	0	33	0	36	0	32	0
Data-related exclusion criteria								
Did not have a behavioral health diagnosis in the baseline period or within a month after the demonstration start date[d]	1	0	2	0	3	0	2	0
Had other insurance coverage	8	0	8	0	10	0	9	0
Had missing or inaccurate county data	1	0	<1	0	1	0	<1.0	0

Source: Mathematica analyses of Minnesota TAF data, 2016 - 2020.

Notes: This table describes the characteristics of beneficiaries who had at least one claim from a CCBHCs between the demonstration start date and December 31, 2020, by year of the first claim and analysis population status.

[a] This column includes all beneficiaries whose first claim from a CCBHC during the demonstration period occurred in this demonstration year, including those who met any of the enrollment- or data-related exclusion criteria used to identify the analysis population. (More information on exclusion criteria is available in Appendix A). However, some beneficiaries, especially those with a first claim during the demonstration period in 2017, might have received services from the CCBHCs before the demonstration began and were existing clients at the start of the demonstration.

[b] This column includes all beneficiaries whose first claim from a CCBHC during the demonstration period occurred in this demonstration year and who were included in the final analysis population treatment group. None of the beneficiaries in this column met any of the enrollment- or data-related exclusion criteria. (More information on impact analysis exclusion criteria is available in Appendix A).

[c] We measured these characteristics on each beneficiary's demonstration enrollment date (that is, the date they had their first visit to a CCBHC during the demonstration period).

[d] We searched TAF claims and encounter records for evidence of behavioral health conditions over the 18 months before the demonstration start date.

CCBHC = Certified Community Behavioral Health Clinic; CHIP = Children's Health Insurance Program; HCBS = home and community-based services; SD = standard deviation; TAF = Transformed Medicaid Statistical Information System Analytic File.

Appendix Exhibit B.2. Characteristics of Medicaid beneficiaries served by CCBHCs in Nevada

	First visit to a CCBHC in Demonstration Year 1 (July 1, 2017, to June 30, 2018)		First visit to a CCBHC in Demonstration Year 2 (July 1, 2018, to June 30, 2019)		First visit to a CCBHC in Demonstration Year 3 (July 1, 2019, to June 30, 2020)		First visit to a CCHC in Demonstration Year 4 (July 1, 2020, to December 31, 2020)	
	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]
Sample size	839	462	856	451	1,680	1,009	566	348
Demographic and eligibility characteristics at first visit (percentage unless otherwise noted)								
Age, mean (SD)	32 (13)	32 (12)	30 (14)	30 (14)	31 (14)	30 (14)	31 (13)	30 (13)
Age category								
18 and younger	16	16	23	26	23	26	19	20
19 to 34	43	45	42	38	40	39	45	46
35 to 49	28	27	24	25	26	25	26	24
50 and older	13	12	11	11	11	10	10	10
Male	51	49	54	49	45	44	52	49
Race and ethnicity								
Non-Hispanic White	72	72	65	66	44	42	53	53
Non-Hispanic Black	6	5	8	6	19	19	16	17
Hispanic	13	10	18	18	29	31	21	19
Other races and ethnicities	7	11	8	9	7	7	9	10
Unknown race and ethnicity	2	<1	1	<1	2	1	<1	<1
Characteristic of beneficiary's zip code								
Large metro area	15	12	19	16	66	69	39	37
Small metro area	14	16	15	19	6	6	16	18
Non-metro, urban area	60	71	56	64	23	24	40	44
Non-metro, rural area	<1	<1	<1	<1	1	<1	<1	<1

	First visit to a CCBHC in Demonstration Year 1 (July 1, 2017, to June 30, 2018)		First visit to a CCBHC in Demonstration Year 2 (July 1, 2018, to June 30, 2019)		First visit to a CCBHC in Demonstration Year 3 (July 1, 2019, to June 30, 2020)		First visit to a CCHC in Demonstration Year 4 (July 1, 2020, to December 31, 2020)	
	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]
Medicaid eligibility status at enrollment								
Pregnant	2	0	2	0	3	0	3	0
Child	16	16	23	25	24	27	19	21
Adult, non-expansion	11	16	11	13	15	16	17	20
Disabled	11	10	7	8	3	3	4	4
Aged	<1	0	<1	0	<1	0	<1	0
Adult expansion	59	59	58	53	55	55	57	56
Enrolled in a comprehensive managed care plan	8	4	14	9	59	67	42	45
Enrollment-related exclusion criteria								
Dually eligible for Medicare and Medicaid[a]	3	0	2	0	2	0	<1	0
Not eligible for Medicaid or CHIP[a]	0	0	<1	0	0	0	0	0
Had restricted benefits[a]	2	0	2	0	4	0	4	0
Had less than six months of Medicaid data in the baseline period	36	0	38	0	31	0	32	0
Data-related exclusion criteria								
Did not have a behavioral health diagnosis in the baseline period or within a month after the demonstration start date[c]	2	0	4	0	6	0	6	2

	First visit to a CCBHC in Demonstration Year 1 (July 1, 2017, to June 30, 2018)		First visit to a CCBHC in Demonstration Year 2 (July 1, 2018, to June 30, 2019)		First visit to a CCBHC in Demonstration Year 3 (July 1, 2019, to June 30, 2020)		First visit to a CCHC in Demonstration Year 4 (July 1, 2020, to December 31, 2020)	
	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]
Had other insurance coverage[a]	4	0	5	0	6	0	6	4
Had missing or inaccurate county data	10	0	9	0	4	0	4	10

Source: Mathematica analyses of Nevada TAF data, 2015 - 2020.

Notes: This table describes the characteristics of beneficiaries who had at least one claim from a CCBHCs between the demonstration start date and December 31, 2020, by year of the first claim and analysis population status.

[a] This column includes all beneficiaries whose first claim from a CCBHC during the demonstration period occurred in this demonstration year, including those who met any of the enrollment- or data-related exclusion criteria used to identify the analysis population. (More information on exclusion criteria is available in Appendix A). However, some beneficiaries, especially those with a first claim during the demonstration period in 2017, might have received services from the CCBHCs before the demonstration began and were existing clients at the start of the demonstration.

[b] This column includes all beneficiaries whose first claim from a CCBHC during the demonstration period occurred in this demonstration year and who were included in the final analysis population treatment group. None of the beneficiaries in this column met any of the enrollment- or data-related exclusion criteria. (More information on impact analysis exclusion criteria is available in Appendix A).

[c] We measured these characteristics on each beneficiary's demonstration enrollment date (that is, the date they had their first visit to a CCBHC during the demonstration period).

[d] We searched TAF claims and encounter records for evidence of behavioral health conditions over the 24 months before the demonstration start date.

CCBHC = Certified Community Behavioral Health Clinic; CHIP = Children's Health Insurance Program; HCBS = home and community-based services; SD = standard deviation; TAF = Transformed Medicaid Statistical Information System Analytic File.

Appendix Exhibit B.3. Characteristics of Medicaid beneficiaries served by CCBHCs in Oklahoma

	First visit to a CCBHC in Demonstration Year 1 (April 1, 2017, to March 31, 2018)		First visit to a CCBHC in Demonstration Year 2 (April 1, 2018, to March 31, 2019)		First visit to a CCBHC in Demonstration Year 3 (April 1, 2019, to March 31, 2020)		First visit to a CCHC in Demonstration Year 4 (April 1, 2020, to December 31, 2020)	
	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]
Sample size	10,027	5,077	5,310	2,362	5,538	2,373	3,620	1,652
Demographic and eligibility characteristics at first visit (percentage unless otherwise noted)								
Age, mean (SD)	28 (18)	24 (17)	24 (17)	19 (14)	24 (17)	19 (14)	23 (16)	18 (13)
Age category								
18 and younger	45	57	52	68	55	69	52	68
19 to 34	19	17	22	16	20	15	25	19
35 to 49	18	14	15	10	14	10	15	9
50 and older	17	12	11	6	11	6	8	4
Male	44	48	43	47	44	47	38	41
Race and ethnicity								
Non-Hispanic White	59	55	56	50	57	51	59	54
Non-Hispanic Black	13	13	11	11	10	10	9	9
Hispanic	8	9	8.3	10	9	10	9	11
Other races and ethnicities	16	19	20	24	20	23	19	22
Unknown race and ethnicity	4	4	5	5	4	4	4	4
Characteristic of beneficiary's zip code								
Large metro area	40	43	38	39	34	35	37	35
Small metro area	11	11	11	12	11	12	14	14
Non-metro, urban area	42	46	44	49	49	52	47	50

	First visit to a CCBHC in Demonstration Year 1 (April 1, 2017, to March 31, 2018)		First visit to a CCBHC in Demonstration Year 2 (April 1, 2018, to March 31, 2019)		First visit to a CCBHC in Demonstration Year 3 (April 1, 2019, to March 31, 2020)		First visit to a CCHC in Demonstration Year 4 (April 1, 2020, to December 31, 2020)	
	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]
Non-metro, rural area	<1	<1	<1	<1	1	<1	1	1
Medicaid eligibility status at enrollment								
Pregnant	2	2	4	2	4	3	6	5
Child	47	58	53	69	56	70	53	70
Adult, non-expansion	15	12	17	13	16	13	21	14
Disabled	35	28	24	15	22	14	19	12
Aged	2	<1	1	<1	1	<1	1	<1
Enrolled in a primary care case management program	50	82	51	82	56	83	54	80
Enrolled in an HCBS waiver or program	1	1	<1	1	0.4	0.6	<1	<1
Enrollment-related exclusion criteria								
Dually eligible for Medicare and Medicaid[c]	16	0	11	0	9	0	9	0
Not eligible for Medicaid or CHIP[c]	4	0	5	0	3	0	<1	0
Had restricted benefits[c]	4	0	5	0	3	0	<1	0
Had less than 6 months of Medicaid data in the baseline period	42	0	48	0	47	0	46	0
Data-related exclusion criteria								
Did not have a behavioral health diagnosis in the baseline period or within a	4	0	10	0	14	0	11	0

	First visit to a CCBHC in Demonstration Year 1 (April 1, 2017, to March 31, 2018)		First visit to a CCBHC in Demonstration Year 2 (April 1, 2018, to March 31, 2019)		First visit to a CCBHC in Demonstration Year 3 (April 1, 2019, to March 31, 2020)		First visit to a CCHC in Demonstration Year 4 (April 1, 2020, to December 31, 2020)	
	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]	All beneficiaries[a]	Beneficiaries included in impact analyses[b]
month after the demonstration start date[d]								
Had other insurance coverage[c]	21	0	21	0	20	0	25	0
Had missing or inaccurate county data	7	0	7	0	6	0	2	0

Source: Mathematica analyses of Oklahoma TAF data, 2015 - 2020.

Notes: This table describes the characteristics of beneficiaries who had at least one claim from a CCBHCs between the demonstration start date and December 31, 2020, by year of the first claim and analysis population status.

[a] This column includes all beneficiaries whose first claim from a CCBHC during the demonstration period occurred in this demonstration year, including those who met any of the enrollment- or data-related exclusion criteria used to identify the analysis population. (More information on exclusion criteria is available in Appendix A). However, some beneficiaries, especially those with a first claim during the demonstration period in 2017, might have received services from the CCBHCs before the demonstration began and were existing clients at the start of the demonstration.

[b] This column includes all beneficiaries whose first claim from a CCBHC during the demonstration period occurred in this demonstration year and who were included in the final analysis population treatment group. None of the beneficiaries in this column met any of the enrollment- or data-related exclusion criteria. (More information on impact analysis exclusion criteria is available in Appendix A).

[c] We measured these characteristics on each beneficiary's demonstration enrollment date (that is, the date they had their first visit to a CCBHC during the demonstration period).

[d] We searched TAF claims and encounter records for evidence of behavioral health conditions over the 24months before the demonstration start date.

CCBHC = Certified Community Behavioral Health Clinic; CHIP = Children's Health Insurance Program; HCBS = home and community-based services; SD = standard deviation; TAF = Transformed Medicaid Statistical Information System Analytic File.

Appendix C. Characteristics of People Served by CCBHCs

Appendix Exhibit C.1. Age and gender of people served by original state CCBHCs, by state and year

	Number of CCBHCs	Denominator	Child/adolescent age 0-17 years	Adult age_18+ years	Gender female	Gender male	Gender Other option or not reported
DY1 Aggregate	56	286089	24%	76%	52%	48%	0%
DY2 Aggregate	56	308831	24%	76%	51%	48%	1%
DY3 Aggregate	53	303911	24%	76%	52%	48%	0%
DY4 Aggregate	53	315349	24%	76%	53%	46%	1%
DY5 Aggregate	54	340334	25%	75%	53%	46%	1%
MN DY1	6	23027	27%	73%	51%	49%	0%
MN DY2	6	25402	26%	74%	50%	49%	0%
MN DY3	6	23935	25%	75%	50%	50%	0%
MN DY4	6	20725	27%	73%	51%	47%	2%
MN DY5	6	23586	29%	71%	52%	48%	0%
MO DY1	15	121787	24%	76%	53%	47%	0%
MO DY2	15	132565	26%	74%	52%	47%	0%
MO DY3	15	137753	26%	74%	53%	47%	0%
MO DY4	15	145949	25%	75%	54%	45%	0%
MO DY5	15	159468	26%	74%	54%	46%	0%
NJ DY1	7	17851	19%	81%	56%	44%	0%
NJ DY2	7	19129	18%	82%	55%	44%	0%
NJ DY3	7	20396	15%	85%	56%	44%	0%
NJ DY4	7	21742	14%	86%	57%	43%	0%
NJ DY5	7	20121	14%	86%	58%	42%	0%
NY DY1	13	49903	22%	78%	48%	52%	0%
NY DY2	13	55693	22%	78%	48%	52%	0%
NY DY3	13	57377	22%	78%	49%	51%	0%
NY DY4	13	62972	23%	77%	52%	48%	0%
NY DY5	13	68248	25%	75%	52%	47%	0%
OK DY1	3	20610	25%	75%	52%	48%	0%
OK DY2	3	22741	27%	73%	52%	48%	0%
OK DY3	3	24647	28%	70%	51%	48%	0%
OK DY4	3	25583	28%	72%	53%	47%	0%
OK DY5	3	27201	28%	71%	53%	47%	0%
OR DY1	12	52911	24%	76%	52%	48%	1%
OR DY2	12	53301	24%	76%	50%	46%	3%
OR DY3	9	39803	22%	78%	51%	46%	2%

	Number of CCBHCs	Denominator	Child/adolescent age 0-17 years	Adult age_18+ years	Gender female	Gender male	Gender Other option or not reported
OR DY4	9	38378	21%	79%	52%	45%	4%
OR DY5	10	41710	21%	79%	51%	45%	3%

Source: Mathematica and RAND analysis of DY1 to DY5 CCBHC quality measures and state response to follow-up questions.

Note: Missouri caseload counts reflect the 15 original demonstration clinics. We excluded partial data for several clinics added to the demonstration partway through DY5. Oregon began the demonstration with 12 CCBHCs but decreased to 9 CCBHCs in DY3 and DY4. One clinic was recertified and began submitting data again by DY5. Quality measure reports for Nevada were excluded as they were only available for DY1.The DY3 and DY4 measurement years include the COVID-19 PHE. In the original states, DY1 = 2017-2018, DY2 = 2018-2019, DY3 = 2019-2020, DY4 = 2020-2021, DY5 = 2021-2022.

CCBHC = Certified Community Behavioral Health Clinic; DY = demonstration year.

Appendix Exhibit C.2. Age and gender of people served by CARES Act state CCBHCs in DY1, by state

	Number of CCBHCs	Denominator	Child/adolescent age 0-17 years	Adult age 18+ years	Gender female	Gender male	Gender Other option or not reported
MI DY1	13	82280	25%	76%	49%	51%	0%

Source: Mathematica and RAND analysis of CCBHC quality measure reports.

Note: CARES Cohort DY1 includes October 2021 - September 2022 in Michigan. Kentucky encountered challenges reporting demographic characteristics of people served in year one and resubmitted their quality measure data after the cutoff date for inclusion in this report.

CCBHC = Certified Community Behavioral Health Clinic; DY = demonstration year.

Appendix Exhibit C.3. Race of people served by original state CCBHCs, by state and year

	Number of CCBHCs	Denominator	White	Black or African American	American Indian or Alaskan Native	Native Hawaiian or Pacific Islander	Asian	More than one race	Unknown
DY1 Aggregate	56	286089	72%	12%	2%	0%	1%	5%	9%
DY2 Aggregate	56	308831	70%	11%	2%	0%	1%	7%	8%
DY3 Aggregate	53	303911	72%	12%	2%	0%	1%	7%	6%
DY4 Aggregate	53	315349	73%	12%	2%	0%	1%	5%	7%
DY5 Aggregate	54	340334	73%	11%	2%	0%	1%	5%	7%
MN DY1	6	23027	69%	12%	2%	0%	4%	5%	8%
MN DY2	6	25402	67%	12%	2%	0%	5%	6%	7%
MN DY3	6	23935	69%	12%	3%	0%	5%	6%	6%
MN DY4	6	20725	69%	12%	3%	0%	6%	5%	5%
MN DY5	6	23586	67%	14%	3%	0%	6%	5%	5%

	Number of CCBHCs	Denominator	White	Black or African American	American Indian or Alaskan Native	Native Hawaiian or Pacific Islander	Asian	More than one race	Unknown
MO DY1	15	121787	80%	10%	1%	0%	0%	2%	6%
MO DY2	15	132565	77%	11%	1%	0%	0%	5%	5%
MO DY3	15	137753	80%	10%	1%	0%	0%	4%	5%
MO DY4	15	145949	80%	10%	1%	0%	0%	3%	6%
MO DY5	15	159468	81%	10%	1%	0%	0%	2%	6%
NJ DY1	7	17851	55%	15%	0%	0%	3%	6%	19%
NJ DY2	7	19129	50%	16%	0%	0%	4%	11%	16%
NJ DY3	7	20396	44%	17%	0%	0%	4%	16%	17%
NJ DY4	7	21742	51%	16%	0%	0%	4%	2%	23%
NJ DY5	7	20121	56%	14%	0%	0%	4%	3%	20%
NY DY1	13	49903	62%	21%	1%	0%	1%	9%	6%
NY DY2	13	55693	62%	19%	1%	0%	1%	13%	4%
NY DY3	13	57377	62%	19%	1%	0%	1%	12%	4%
NY DY4	13	62972	65%	18%	1%	0%	1%	10%	5%
NY DY5	13	68248	66%	18%	1%	0%	1%	10%	3%
OK DY1	3	20610	72%	13%	8%	0%	1%	5%	1%
OK DY2	3	22741	65%	12%	7%	0%	1%	3%	14%
OK DY3	3	24647	72%	11%	8%	0%	1%	8%	0%
OK DY4	3	25583	73%	11%	8%	0%	1%	8%	0%
OK DY5	3	27201	72%	10%	8%	0%	0%	10%	0%
OR DY1	12	52911	71%	3%	2%	0%	1%	6%	16%
OR DY2	12	53301	72%	3%	2%	0%	1%	7%	13%
OR DY3	9	39803	75%	4%	3%	1%	1%	6%	11%
OR DY4	9	38378	72%	4%	3%	1%	1%	5%	15%
OR DY5	10	41710	71%	4%	3%	1%	1%	6%	15%

Source: Mathematica and RAND analysis of DY1 to DY5 CCBHC quality measures and state response to follow-up questions.

Note: Missouri caseload counts reflect the 15 original demonstration clinics. We excluded partial data for several clinics added to the demonstration partway through DY5. Oregon began the demonstration with 12 CCBHCs but decreased to 9 CCBHCs in DY3 and DY4. One clinic was recertified and began submitting data again by DY5. Quality measure reports for Nevada were excluded as they were only available for DY1. The DY3 and DY4 measurement years include the COVID-19 PHE. In the original states, DY1 = 2017-2018, DY2 = 2018-2019, DY3 = 2019-2020, DY4 = 2020-2021, DY5 = 2021-2022.

CCBHC = Certified Community Behavioral Health Clinic; DY = demonstration year.

Appendix Exhibit C.4. Race of people served by CARES Act state CCBHCs in DY1, by state

	Number of CCBHCs	Denominator	White	Black or African American	American Indian or Alaskan Native	Native Hawaiian or Pacific Islander	Asian	More than one race	Unknown
MI DY1	13	82280	62%	22%	0%	0%	1%	7%	7%

Source: Mathematica and RAND analysis of CCBHC quality measure reports.

Note: CARES Cohort DY1 includes October 2021- September 2022 in Michigan. Kentucky encountered challenges reporting demographic characteristics of people served in year one and resubmitted their quality measure data after the cutoff date for inclusion in this report.

CCBHC = Certified Community Behavioral Health Clinic; DY = demonstration year.

Appendix Exhibit C.5. Ethnicity of people served by original state CCBHCs, by state and year

	Number of CCBHCs	Denominator	Ethnicity Not Hispanic or Latino	Ethnicity Hispanic or Latino	Ethnicity unknown
DY1 Aggregate	56	286089	76%	9%	16%
DY2 Aggregate	56	308831	79%	10%	12%
DY3 Aggregate	53	303911	81%	8%	11%
DY4 Aggregate	53	315349	82%	8%	10%
DY5 Aggregate	54	340334	81%	10%	9%
MN DY1	6	23027	64%	5%	30%
MN DY2	6	25402	75%	6%	19%
MN DY3	6	23935	84%	6%	10%
MN DY4	6	20725	86%	7%	7%
MN DY5	6	23586	80%	7%	14%
MO DY1	15	121787	75%	5%	19%
MO DY2	15	132565	82%	6%	11%
MO DY3	15	137753	84%	5%	11%
MO DY4	15	145949	88%	4%	7%
MO DY5	15	159468	86%	4%	9%
NJ DY1	7	17851	67%	17%	16%
NJ DY2	7	19129	71%	19%	11%
NJ DY3	7	20396	53%	11%	36%
NJ DY4	7	21742	42%	10%	47%
NJ DY5	7	20121	56%	14%	29%
NY DY1	13	49903	78%	17%	4%
NY DY2	13	55693	80%	17%	3%
NY DY3	13	57377	79%	15%	6%
NY DY4	13	62972	81%	14%	5%
NY DY5	13	68248	73%	13%	14%
OK DY1	3	20610	92%	6%	2%
OK DY2	3	22741	81%	5%	14%
OK DY3	3	24647	92%	6%	1%
OK DY4	3	25583	93%	7%	1%
OK DY5	3	27201	91%	7%	2%
OR DY1	12	52911	76%	8%	16%
OR DY2	12	53301	72%	10%	18%
OR DY3	9	39803	76%	10%	14%
OR DY4	9	38378	73%	11%	16%
OR DY5	10	41710	74%	14%	11%

Source: Mathematica and RAND analysis of DY1 to DY5 CCBHC quality measures and state response to follow-up questions.

Note: Missouri caseload counts reflect the 15 original demonstration clinics. We excluded partial data for several clinics added to the demonstration partway through DY5. Oregon began the demonstration with 12 CCBHCs but decreased to 9 CCBHCs in

DY3 and DY4. One clinic was recertified and began submitting data again by DY5. Quality measure reports for Nevada were excluded as they were only available for DY1. The DY3 and DY4 measurement years include the COVID-19 PHE. In the original states, DY1 = 2017-2018, DY2 = 2018-2019, DY3 = 2019-2020, DY4 = 2020-2021, DY5 = 2021-2022.

CCBHC = Certified Community Behavioral Health Clinic; DY = demonstration year.

Appendix Exhibit C.6. Ethnicity of people served by CARES Act state CCBHCs in DY1, by state

	Number of CCBHCs	Denominator	Ethnicity Not Hispanic or Latino	Ethnicity Hispanic or Latino	Ethnicity unknown
MI DY1	13	82280	82%	7%	11%

Source: Mathematica and RAND analysis of CCBHC quality measure reports.

Note: CARES Cohort DY1 includes October 2021- September 2022 in Michigan. Kentucky encountered challenges reporting demographic characteristics of people served in year one and resubmitted their quality measure data after the cutoff date for inclusion in this report.

CCBHC = Certified Community Behavioral Health Clinic; DY = demonstration year.

Appendix Exhibit C.7. Insurance status of people served by original state CCBHCs, by state and year

	Number of CCBHCs	Denominator	Medicaid + CHIP + Dual	Medicare	Commercially insured	VHA + Other	Uninsured
DY1 Aggregate	56	286089	64%	5%	16%	4%	15%
DY2 Aggregate	56	308831	62%	5%	16%	5%	16%
DY3 Aggregate	53	303911	62%	5%	17%	4%	15%
DY4 Aggregate	52	307408	62%	4%	19%	5%	14%
DY5 Aggregate	54	340334	62%	4%	20%	5%	12%
MN DY1	6	23027	59%	6%	20%	11%	5%
MN DY2	6	25402	58%	6%	22%	12%	4%
MN DY3	6	23935	58%	7%	21%	13%	2%
MN DY4	6	20725	61%	4%	20%	12%	5%
MN DY5	6	23586	59%	4%	20%	10%	5%
MO DY1	15	121787	61%	6%	17%	4%	21%
MO DY2	15	132565	56%	6%	17%	5%	24%
MO DY3	15	137753	57%	6%	18%	4%	22%
MO DY4	15	145949	56%	6%	21%	6%	20%
MO DY5	15	159468	56%	5%	22%	6%	17%
NJ DY1	7	17851	60%	9%	23%	2%	5%
NJ DY2	7	19129	61%	8%	23%	2%	6%
NJ DY3	7	20396	58%	8%	25%	3%	6%
NJ DY4	6	13801	65%	8%	22%	5%	7%
NJ DY5	7	20121	63%	5%	24%	4%	6%
NY DY1	13	49903	71%	4%	19%	2%	4%
NY DY2	13	55693	71%	5%	18%	1%	5%

	Number of CCBHCs	Denominator	Medicaid + CHIP + Dual	Medicare	Commercially insured	VHA + Other	Uninsured
NY DY3	13	57377	72%	3%	21%	1%	4%
NY DY4	13	62972	70%	3%	23%	1%	3%
NY DY5	13	68248	68%	5%	23%	1%	3%
OK DY1	3	20610	49%	4%	9%	1%	36%
OK DY2	3	22741	48%	4%	12%	1%	36%
OK DY3	3	24647	47%	3%	14%	1%	34%
OK DY4	3	25583	55%	2%	15%	2%	27%
OK DY5	3	27201	62%	5%	16%	1%	18%
OR DY1	12	52911	70%	3%	9%	4%	14%
OR DY2	12	53301	74%	3%	10%	7%	10%
OR DY3	9	39803	80%	3%	7%	5%	10%
OR DY4	9	38378	79%	3%	7%	3%	9%
OR DY5	10	41710	81%	2%	7%	3%	7%

Source: Mathematica and the RAND Corporation's analysis of DY1 to DY5 CCBHC quality measures and state response to follow-up questions.

Note: Missouri caseload counts reflect the 15 original demonstration clinics. We excluded partial data for several clinics added to the demonstration partway through DY5. Oregon began the demonstration with 12 CCBHCs but decreased to 9 CCBHCs in DY3 and DY4. One clinic was recertified and began submitting data again by DY5. Insurance status categories were not mutually exclusive and percentages may not add to 100% for each state DY. Oklahoma Medicaid expansion took effect July 1, 2021 which may have influenced changes in DY3-DY4. Oregon DY2 and DY3 is over 100% and the state possibly double counted their CHIP clients. Quality measure reports for Nevada were excluded as they were only available for DY1. One clinic in New Jersey did not report in DY4. The DY3 and DY4 measurement years include the COVID-19 PHE. In the original states, DY1 = 2017-2018, DY2 = 2018-2019, DY3 = 2019-2020, DY4 = 2020-2021, DY5 = 2021-2022.

CCBHC = Certified Community Behavioral Health Clinic; CHIP = Children's Health Insurance Program; DY = demonstration year; VHA = Veteran's Health Administration.

Appendix Exhibit C.8. Insurance status of people served by CARES Act state CCBHCs in DY1, by state

	Number of CCBHCs	Denominator	Medicaid + CHIP + Dual	Medicare	Commercially insured	VHA + Other	Uninsured
MI DY1	13	82280	85%	3%	5%	0%	10%

Source: Mathematica and RAND analysis of CCBHC quality measure reports.

Note: CARES Cohort DY1 encompasses October 2021- September 2022 in Michigan. Kentucky encountered challenges reporting demographic characteristics of people served in year one and resubmitted their quality measure data after the cutoff date for inclusion in this report.

CCBHC = Certified Community Behavioral Health Clinic; DY = demonstration year.