Final Report

The Impact of Housing Programs and Services on Health Care Costs, Quality, and Member Experience

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Executive Summary

NORC at the University of Chicago is pleased to present findings from an evaluation of the Permanent Supportive Housing (PSH) program and services. The PSH program and services aid individuals with serious mental illness (SMI) enrolled in the Mercy Maricopa Integrated Care (Mercy Maricopa) Medicaid managed care plan in Maricopa and parts of Pinal County, Arizona. Mercy Maricopa is a local not-for-profit health plan sponsored by Mercy Care Plan (MCP) and Maricopa Integrated Health Systems, and is administered by Aetna. In March 2013, Mercy Maricopa was awarded the Regional Behavioral Health Authority (RBHA) contract for Maricopa County by the Arizona Department of Health Services (ADHS), now managed by the Arizona Health Care Cost Containment System (AHCCCS), Arizona’s Medicaid agency.

We conducted a mixed-methods evaluation using health care cost and utilization data provided by Mercy Maricopa, and semi-structured interviews with service providers, member advocates, and other stakeholders. This report describes the PSH program and services and presents findings on 1) the characteristics of members served by the PSH programs, 2) the overall health care experience of individuals served by PSH programs, 3) the impact of the PSH program on cost of care, and 4) the impact of the program on utilization-based quality measures for PSH program members.

Due to data availability, we evaluated cost and quality measures for members enrolled in one component of PSH, the Scattered Site subsidy program. Scattered Site is the largest PSH program offered by Mercy Maricopa. We analyzed differences in cost and quality of care before and after enrollment for members receiving a subsidy. To evaluate program impact, we compared change in health care cost and quality of services for members enrolled in Scattered Site to the change for a comparison group of Mercy Maricopa members who were on the waiting list for the Scattered Site program. Members in both groups had a SMI diagnosis. We matched Scattered Site enrollees to members in the comparison group using propensity score methods. Matching variables included demographic characteristics and illness burden-measured using the Chronic Illness and Disability Payment System (CDPS) algorithm, a diagnosis and pharmacy based risk adjustment model score.¹ We acknowledge limitations in our ability to replicate all of the relevant characteristics of the treatment population within the comparison group given the available data.

¹ The Chronic Illness and Disability Payment System (CDPS)–a diagnosis and pharmacy based risk adjustment model–was used to account for differences in illness burden across the treatment and comparison groups. The CDPS risk score factors in an individual’s age, gender, cumulative diagnoses, and cumulative disease severity to create a value used for risk adjustment, a higher score from zero denotes a higher burden of disease.
Despite these limitations, use of a matched comparison group in observational research can help us attribute changes in outcomes to a specific program, as opposed to other factors.

**What is the Permanent Supportive Housing program and services?**

The PSH program and services enable members who are homeless and have a SMI diagnosis, to access a supportive housing subsidy and support services. Members may choose from the following housing options, depending on their needs:

- **Community housing:** Members choose to live in a house or apartment within Mercy Maricopa’s housing network.
- **Scattered Site Housing:** Members select their own house or apartment in the community.
- **Bridge to Permanency:** Members choose a house or apartment in the community, within the coverage area of the partnering Public Housing Authority (PHA). The goal of this program is to transition a member from a Mercy Maricopa subsidy to a Housing Choice Voucher/Section 8.

The Scattered Site program is Mercy Maricopa’s largest subsidy program, 59 percent (1,097) of the total subsidies available are for the Scattered Site program. The Community Housing program makes up 34 percent of subsidies (634), and the Bridge to Permanency program makes up the remaining 7 percent (125) of subsidies. Members who need housing support are screened using the Vulnerability Index-Service Prioritization Decision Assistance Tool (VI-SPDAT) evaluation and may qualify for a subsidy based on their score.²

In addition to these subsidy programs, PSH services are also available to help members with SMI retain their existing housing. These individuals may or may not be also receiving a subsidy. PSH services may include assistance with activities of daily living, skills training and development, budgeting, transportation, health education, conflict resolution, crisis response, and assistance with socialization and seeking employment.

Due to data limitations, our quantitative analysis focuses exclusively on Scattered Site. However, our qualitative research offers broader findings on PSH. We collected qualitative data encompassing all three subsidy programs and the PSH services.

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² Members must have a score of 8 or higher on their Vulnerability Index - Service Prioritization Decision Assistance Tool (VI-SPDAT) evaluation. See [http://www.orgcode.com/spdat](http://www.orgcode.com/spdat) for more information on this tool.
Who receives a Scattered Site Housing subsidy?

In the study, 606 members in the Scattered Site Housing program—the largest PSH subsidy program—were eligible for Medicaid an average of 7 cumulative months, or 2.3 quarters prior to enrollment in the program. In addition, the majority of members in the Scattered Site program were female (56%).

Compared to enrollees in the Mercy Maricopa supported employment intervention and Assertive Community Treatment (ACT) program, Scattered Site enrollees have a slightly higher average CDPS risk score, demonstrating a high burden of disease among this group.

How does the Permanent Supportive Housing program work?

Mercy Maricopa increased access to the PSH programs and services. Most providers and Mercy Maricopa staff believed that integrating supportive housing services in clinics and devoting more resources to these services, has increased access to housing for Mercy Maricopa members. Stakeholders, however, noted some considerations that may have affected the integration and expansion of housing and other services at clinics, including the importance of retaining qualified staff and how limits to available housing poses challenges to the program.

Mercy Maricopa provides member-centered care through its PSH program. Mercy Maricopa staff and stakeholders describe the PSH program, and Mercy Maricopa’s overall approach to care, as “member-centric.” In line with the SAMHSA Fidelity model, Mercy Maricopa follows a Housing First model for the PSH program ensuring that members have full agency to obtain and direct their services and supports. With the implementation and expansion of the Fidelity model, both in response to the Arnold v. Sarn settlement and as an extension of Mercy Maricopa’s member-oriented approach to health care, providers reoriented their focus from provider-directed care to that of member-directed goals.

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3 Throughout this report, unless otherwise noted, when we refer to Scattered Site program members, we are referring to the members in our Scattered Site Housing program sample.

4 Mercy Maricopa adheres to the Substance Abuse and Mental Health Services Administration (SAMHSA) Fidelity model for their programs. SAMHSA defines fidelity as “the degree to which a program is implemented as its developer intended. If a program closely adheres to the original strategy, it’s more likely to replicate the positive outcomes of the program’s initial implementation or testing.” See https://www.samhsa.gov/capt/applying-strategic-prevention-framework/step5-evaluation/process-outcomes-evaluation.

5 Housing First is an approach to reducing homelessness that prioritizes housing above other less critical factors such as obtaining employment or maintaining sobriety. The Housing First model does not require individuals to address their behavioral health or substance use problems before being accepted.

6 Under a judgment reached in 1986 and affirmed by the State Supreme Court in 1991, the state was required to provide a combination of supportive housing, supported employment, Assertive Community Treatment (ACT), and peer and family services to individuals with SMI in Maricopa County. In January 2014, the parties reached a settlement to the lawsuit, which included specific requirements to increase the number of individuals served by the employment, housing, ACT, and peer support services and to implement ongoing evaluation tools in line with the SAMHSA Fidelity model.
How does the Scattered Site Housing subsidy affect health care costs?

In at least one quarter prior to their enrollment in the intervention, members enrolled in the Scattered Site housing program incurred average health care costs of $20,000 per member per quarter. This high cost is likely due to the high-acuity and chronic homelessness of individuals who receive a housing subsidy through the Scattered Site program.

Members enrolled in the Scattered Site program experienced a 24 percent decrease, or $4,623 per member per quarter, in total cost of care after enrolling in the program. This cost decrease was driven by significant reductions in behavioral health costs. We found behavioral health professional services costs decreased 23 percent per member per quarter, and behavioral health facility costs decreased by 46 percent. Overall inpatient facility costs also showed a downward trend, but this was not significant. Pharmacy costs did not change.

Relative to a comparison group, members enrolled in Scattered Site experienced reductions in costs in all categories. When we added a comparison group, we continued to see statistically significant differences in cost reduction between the treatment and comparison groups. The reduction in the total cost of care—approximately $5,000 per member per quarter relative to the comparison group—was driven by reductions in behavioral health facilities and professional services costs. These cost reductions were significant. There was also a reduction in physical health services costs relative to the comparison but that decrease was not significant.

How does the Scattered Site housing subsidy affect certain utilization-based measures of quality?

Members enrolled in the Scattered Site subsidy program experienced a reduction in hospitalizations, specifically psychiatric hospitalizations, after receiving a housing subsidy. Members served by the Scattered Site program experienced reductions in psychiatric hospitalizations after enrollment in the program, and the 20 percent decrease in psychiatric hospitalizations was statistically significant. These findings are consistent with several studies that have found that housing programs can reduce inpatient mental health care utilization. Inpatient hospitalizations and emergency department (ED) visits did not show significant changes before and after the receipt of a subsidy.

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7 Costs measured do not account for increased costs resulting from the subsidy provided by the program. In May 2017, a housing provider reported that a Department of Housing and Urban Development subsidy was $735 for a one-bedroom apartment. The provider also noted that that the amount paid for the Scattered Site program in Arizona, was recently adjusted to $809 per subsidy for a one-bedroom apartment.
Relative to a comparison group, members who receive a Scattered Site subsidy experienced no significant changes in utilization-based quality outcomes after receiving the subsidy. Relative to the comparison group, resulting reductions in utilization were not significant. However, there are promising trends in both psychiatric hospitalizations and ED visits for the group receiving a housing subsidy. This is consistent with the literature. Several studies show that having housing helps individuals obtain outpatient services that could prevent the need for inpatient stays.iv   

What are the program considerations for the Permanent Supportive Housing program?  

Both stakeholders and Mercy Maricopa staff identified several considerations that affected the development and operation of the program and may impact the success and effectiveness of the PSH program and members’ access to care. According to providers, the relationships Mercy Maricopa built with diverse stakeholder and partners have strengthened the fabric of Maricopa County’s safety net for the SMI population and resulted in the more effective and strategic allocation of resources, pairing funding across sources to multiply their impact. These relationships and input from partners allowed Mercy Maricopa to identify overlaps with existing community services and gaps in care and to strategically allocate funding to those services that require additional support.  

Additionally, stakeholders noted challenges to the program and implementation. Stakeholders described difficulties retaining clinical case management staff, which impacts communication among providers and ultimately members’ access to care. Mercy Maricopa is working with clinics to address this and now requires providers to report on case management vacancy rates and enact plans to improve employee retention. Additionally, clinical staff and stakeholders noted housing shortages and rapidly rising rental prices as a barrier to care and are addressing this new challenge in a changing market.  

Both clinical providers and Mercy Maricopa staff also described initial difficulties adjusting to the Fidelity model and the Housing First model. Mercy Maricopa invested in robust educational efforts to shift providers’ perspectives towards the unconditional model of connecting members to housing, and Mercy Maricopa has seen resulting improvement in providers’ adherence to the member-centric model. Finally, stakeholders noted complications that result from coordinating inter-provider communications and sharing patient information.  

What are the policy observations for the Permanent Supportive Housing program?  

Research on the effectiveness of the Housing First model and supportive housing services is mixed. Research generally supports the conclusion that such interventions can lead to reductions in costly
inpatient hospital services for individuals with SMI. However, it remains challenging to attribute changes in health outcomes and cost savings specifically to the use of supportive housing, and the interventions themselves often require significant costs.

We found that members who lived in Scattered Site housing experienced a significant decrease in cost of care through a decrease in behavioral health services including costs associated with facility-based psychiatric episodes. This decrease in cost was maintained in the difference-in-differences analysis and therefore can be attributed to the impact of the housing program. As the qualitative results show, Mercy Maricopa successfully expanded access to PSH and services beyond the requirements of the *Arnold v. Sarn* settlement. Overall, our results are promising. Further research with a larger sample and conducted over a longer time period would provide valuable information on the effectiveness of a PSH subsidy and services to the SMI population on health outcomes and cost.
Introduction and Methods

Introduction

Aetna contracted with NORC at the University of Chicago (NORC) to evaluate several supportive services available for individuals diagnosed with serious mental illness (SMI) enrolled in the Mercy Maricopa Integrated Care (Mercy Maricopa) Medicaid managed care plan in Maricopa and parts of Pinal County, Arizona. We conducted an evaluation of supported employment services, the Permanent Supportive Housing (PSH) program, and the Assertive Community Treatment (ACT) program, and conducted a review of court services. We analyzed enrollment and claims files from Mercy Maricopa and conducted a series of semi-structured interviews with stakeholders, including government officials, service providers, and member advocates. This mixed-methods study examines and provides information on the impact of the PSH program and services for the SMI population on cost, utilization, and member experience.

Background

In recent years, concerns about the health and well-being of individuals have expanded to include a focus on how personal, interpersonal, community, and systemic factors impact physical and mental health. Evidence has demonstrated that interventions that target these factors—such as support obtaining and retaining stable housing and employment—can have far-reaching impact on chronic disease management, mental health stabilization, and substance use treatment. Studies have shown that investments in these interventions may improve health outcomes and can subsequently reduce costs by decreasing hospitalizations, admissions for psychiatric care, and length of hospital stays, particularly for high-risk populations such as individuals with SMI.

Individuals eligible for SMI services are more likely to face unemployment, arrests, and homelessness compared to those without mental illness. Research estimates that approximately 26 percent of adults who are homeless and staying in shelters live with an SMI, and approximately 24 percent of state prisoners have “a recent history of a mental health condition.” Individuals with SMI are also at an increased risk of having chronic medical conditions, and, as a result, die an average of 25 years earlier than the general population, largely due to treatable medical conditions. It is estimated that SMI costs the United States $200 billion annually.

Serious Mental Illness

The Substance Abuse and Mental Health Services Administration (SAMHSA) defines SMI as “having, at any time during the past year, a diagnosable mental, behavioral, or emotional disorder that causes functional impairment that substantially interferes with or limits one or more major life activities.”

vi, vii, viii, ix, x, xi, xii, xiii
States nearly $200 billion in lost earnings every year.\textsuperscript{xiv} For these reasons, interventions targeting the SMI population have become increasingly important.

Mercy Maricopa, an integrated physical and behavioral health Medicaid managed care plan, primarily serves members in Maricopa County, Arizona (including Phoenix). Mercy Maricopa is a local not-for-profit health plan sponsored by Mercy Care Plan (MCP) and Maricopa Integrated Health Systems. MCP is an Arizona nonprofit with a 28-year history of providing Medicaid managed care administration and is sponsored by Dignity Health and Carondelet Health Network. Aetna Medicaid Administrations LLC administers both Mercy Maricopa and MCP.

In March 2013, the Arizona Department of Health Services (ADHS) awarded Mercy Maricopa the Regional Behavioral Health Authority (RBHA). Since that time, state administration of the Medicaid-funded behavioral health program was transferred to the Arizona Health Care Cost Containment System (AHCCCS), Arizona’s Medicaid agency.\textsuperscript{xv} As the RBHA, Mercy Maricopa currently has a contract with AHCCCS to provide:

- Behavioral health services to Medicaid eligible children and adults with general mental health and substance abuse diagnoses, who do not have an SMI diagnosis
- Integrated behavioral health and physical health services to Medicaid eligible adults with SMI
- Substance abuse prevention and treatment and community mental health services, as well as a range of state-funded behavioral health services, for individuals not eligible for Medicaid

In 1981, a class action suit was filed against the state. \textit{Arnold v. Sarn} alleged that ADHS and Maricopa County did not fulfill their statutory obligations to provide a comprehensive community mental health system.\textsuperscript{xvi} Under a judgment reached in 1986 and affirmed by the State Supreme Court in 1991, the state was required to provide a combination of supportive housing, supported employment, ACT, and peer and family services to individuals determined eligible for SMI services in Maricopa County.\textsuperscript{xvii}

In January 2014, the parties reached a settlement to the lawsuit, which included specific requirements to increase the number of individuals served by the housing, employment, ACT, and peer support services and to implement ongoing evaluation tools in line with the SAMHSA Fidelity model. Mercy Maricopa uses the SAMHSA Fidelity model to examine whether a program is implemented as the developer intended and consequently whether it follows evidence-based best practice.\textsuperscript{xviii} Following the settlement, AHCCCS expanded the available services that Mercy Maricopa administers to include additional recipients of a Permanent Supportive Housing (PSH) subsidy and support services, and Mercy Maricopa
continued to expand these services to additional members, beyond those required by the settlement. (See Exhibit 1 for a description of Mercy Maricopa’s PSH services.)

Exhibit 1: Mercy Maricopa Housing Programs and Services

Permanent Supportive Housing

Mercy Maricopa offers housing supportive services (described below) as well as a subsidy that enable members who are homeless with a serious mental illness (SMI) and who qualify through the Vulnerability Index-Service Prioritization Decision Assistance Tool evaluation to choose from one of Mercy Maricopa’s Permanent Supportive Housing (PSH) options. Under Mercy Maricopa’s PSH program, members sign a lease and pay 30 percent of their income towards rent, and a housing subsidy pays the remainder. Members may choose from the following housing options, depending on their needs:

- Community Housing: Members choose to live in a house or apartment within Mercy Maricopa’s housing network.
- Scattered Site Housing: Members select their own house or apartment in the community.
  - Bridge to Permanency: Members choose a house or apartment in the community, within the coverage area of the partnering Public Housing Authority (PHA). The goal of this program is to transition a member from a Mercy Maricopa subsidy to a Housing Choice Voucher/Section 8.

Mercy Maricopa also offers supportive housing services to all members with an SMI to help them to retain their existing or new housing, regardless of whether they obtain housing through Mercy Maricopa. These services include: assistance with activities of daily living, skills training and development, transportation, health education, conflict resolution, crisis response, and assistance with socialization and seeking employment.

The Scattered Site program is Mercy Maricopa’s largest subsidy program, 59 percent (1,097) of the total subsidies available are for the Scattered Site program. The Community Housing program makes up 34 percent of subsidies (634), and the Bridge to Permanency program makes up the remaining 7 percent (125) of subsidies.

Evaluation Design and Methods

We hypothesized that providing housing for individuals with SMI may result in an increase in the use of a regular source of outpatient care and a reduction in utilization and costs associated with emergency and inpatient care. Having a stable home with access to amenities such as air conditioning and a refrigerator (for medications) may allow individuals with SMI to focus on taking their medications and obtaining a regular source of care thereby decreasing their need for emergency or inpatient services.

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8 Unless otherwise noted, this evaluation examines the housing subsidy and services offered by Mercy Maricopa. However, the data presented in the report are specific to the Scattered Site subsidy program.
To investigate this hypothesis, NORC conducted a mixed-methods evaluation that included quantitative and qualitative data collection and analysis. The quantitative portion analyzed only the Scattered Site program—the largest PSH subsidy program—using Mercy Maricopa encounter, demographic, and provider reported information, while the qualitative portion of the evaluation reviewed all PSH programs and services using information gathered through structured and targeted informant interviews, as well as a review of relevant literature. This paper examines the following research questions:

1. What impact do the Mercy Maricopa PSH programs have on overall cost of care for SMI individuals?
2. What impact do the Mercy Maricopa PSH programs have on utilization-based measures of quality of care for SMI individuals?
3. What impact do the Mercy Maricopa PSH programs have on member health care experience?

**Quantitative Data Sources**

Mercy Maricopa provided Medicaid eligibility data files, as well as claims and encounter data (hereinafter referred to as claims) for its members, with flags and enrollment dates indicating program participation. Mercy Maricopa provided Scattered Site enrollment rosters, and the Scattered Site wait and referral list roster files. The housing rosters, eligibility, and claims data were provided for dates ranging from quarter two of calendar year 2014 to quarter two of calendar year 2017. A full description of the data files provided is available in the technical appendix, Appendix A.

**Qualitative Data Sources**

The qualitative data was collected through 25 interviews with 40 individuals representing Mercy Maricopa and their various stakeholders, such as government officials, providers, and member advocates. NORC staff worked with Mercy Maricopa to identify organizations and individuals who had institutional knowledge of the services provided and a historical perspective on the transition to Mercy Maricopa as the RBHA. Mercy Maricopa staff initiated contact with these organizations and provided them with the research questions developed by NORC, and a NORC staff member followed up to schedule the interviews.

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9 Due to the availability of data, the quantitative analysis was limited to the Scattered Site program.
The qualitative team of three NORC researchers conducted a site visit in Maricopa County, Arizona, on May 1-5, 2017, which included interviews with state and local government officials, Mercy Maricopa leadership and staff, clinical providers and case managers, and community organizations and advocates. NORC also conducted an additional interview with a stakeholder organization over the phone on May 12, 2017, and followed up with individual organizations and Mercy Maricopa staff with additional questions, as needed. Interviews were conducted by highly qualified NORC staff, who began each interview by providing background on the study and the overarching research questions. Interviewees were guided through the consent process, and verbal consent was obtained to record each interview. In some cases, Aetna or Mercy Maricopa staff were present for the interviews.

Quantitative Data Analysis

The quantitative analysis presented below studies only the Scattered Site housing program by first assessing the change in health care costs and utilization for Mercy Maricopa members with SMI enrolled in the PSH Scattered Site program before and after program enrollment. Our difference-in-differences (DiD) analysis then goes on to measure program effectiveness by comparing the experiences of Mercy Maricopa members with SMI enrolled in the PSH Scattered Site program with those of a matched group of Mercy Maricopa members with SMI who were waiting for a PSH subsidy.¹⁰ We examined the impact of the Scattered Site program on member’s cost and utilization in each quarter of enrollment in the program. A full technical description of the data sources and quantitative methods used for selection of

¹⁰ Members on the wait list qualified for the PSH program based on their VI-SPDAT score but haven’t yet been referred to a housing provider and have not begun receiving the Scattered Site subsidy.
individuals in both cohorts, identification of categories of claims, and analysis is available in the technical appendix, Appendix A.

The comparison group in our DiD analysis consists of members who were enrolled in Mercy Maricopa during the same time period and who were assumed to be waiting for a subsidy either because they were on the waitlist or referred to PSH for a subsidy but had not yet received the subsidy. To improve comparability by minimizing observed differences between the intervention and comparison groups, we incorporated propensity scoring matching with replacement within the DiD framework. (Please see Table A.2 in Appendix A for more information.)

The PSH Scattered Site referral roster file provided by Mercy Maricopa contained unique identifiers for members who were referred to the Scattered Site program. The PSH Scattered Site wait list roster file contained unique member identifiers for members on the Scattered Site program wait list. We linked the roster files and restricted members to those who:

- Had a valid AHCCCS identifier in the Eligibility file
- Were part of the SMI integrated care Medicaid eligible population
- Had a program enrollment date after the first date of eligibility
- Were 18 years of age or older
- Had no missing demographic information (information available in both the Medicaid eligibility file including gender, race, primary language, dual eligibility status, and indicator of death)
- Had at least one quarter of Medicaid eligibility and claims data available before and after their enrollment in the Scattered Site program

After applying these restrictions, we identified 606 unique Mercy Maricopa Medicaid eligible members with SMI who were enrolled in the Scattered Site program during quarter two of calendar year 2014 to quarter two of calendar year 2017. To identify the comparison group, we included all members on the Scattered Site referral and waitlists who were not enrolled in the Scattered Site program during the analysis period. This yielded a comparison group with 365 unique Mercy Maricopa Medicaid eligible members with SMI who had housing needs, but were not yet enrolled in the Scattered Site program. We utilized propensity score matching with replacement to identify members in the comparison group with demographic and health characteristics that were similar to those in the Scattered Site program. The resulting propensity matched comparison group included 237 unique members.

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11 For the treatment group, calendar quarters occurring prior to enrollment in the Scattered Site program were defined as the pre-period and calendar quarters occurring after enrollment in the program were defined as the post-period. For the comparison group, calendar quarters occurring prior to quarter two of calendar year 2015 were defined as the pre-period and the remaining quarters were defined as the post-period. More information is available on pages 25 and 26 of Appendix A.
There were limitations to identifying an appropriately matched comparison group for those members who enrolled in the PSH Scattered Site program, the first being the time period for which we had available data. To be included, members needed at least one quarter of enrollment in Mercy Maricopa in the periods before and after intervention enrollment. Intervention enrollment was indicated by members’ presence in both the Scattered Site program referral roster and the PSH subsidy roster. The data provided began in April 2014, when Mercy Maricopa became the RBHA, which limited the number of members that met our inclusion criteria. Second, we identified a propensity score-matched comparison group of members in the SMI program who had housing needs but who were not yet enrolled in the Scattered Site program. We matched members on demographic characteristics, illness burden, and total cost of care in the pre-period. Members who need housing support are screened using the Vulnerability Index-Service Prioritization Decision Assistance Tool (VI-SPDAT) evaluation and members are required to have a score of 8 or above to be placed on the Scattered Site waiting list.

Qualitative Data Analysis

For the qualitative analysis, the team developed six interview protocols to capture stakeholder perspectives on each of the research questions for the study and collect contextual information about the expansion of services. The protocols were designed for Mercy Maricopa leadership, clinical providers, community advocates, state employees, city and county employees, and case managers. The protocols had a layer of similar questions to ground the interview responses in relation to the housing, employment, ACT, and court services programs provided by Mercy Maricopa, but each interview was expanded to include prompts tailored to the role of each interviewee. The protocols were reviewed by NORC’s Institutional Review Board and exempted from human subject research, before being shared with Aetna. Following the site visit, all recordings were transcribed by an external transcription agency and transcriptions were used for the following analysis.

Transcripts of each interview were coded and analyzed for themes in response to each of the research questions through NVivo 10 software. The team used a deductive approach utilizing the research questions to organize the data and identify themes and responses. The team developed a codebook by reviewing the research questions and site visit notes and pulling keywords from these documents. (See the table in Appendix B for the full codebook.) The team coded the first two transcripts together in order to

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12 Chronic Illness and Disability Payment System (CDPS)—a diagnosis and pharmacy based risk adjustment model—was used to account for differences in illness burden across treatment and comparison groups.

13 See http://www.orgcode.com/spdat for more information on this tool.

14 NORC did not speak with Mercy Maricopa members due to privacy concerns. Case managers were interviewed to provide perspective on members’ experiences.
establish a concordant coding style and address any discrepancies, and the remaining transcripts were divided between the team members, coded, and merged into a master NVivo file for subsequent analysis. The team queried various codes across the interviews and reviewed the textual data that was associated with the relevant codes. Upon full review, the NORC team identified themes that cut across interviews and were responsive to the research questions.

Findings

In the sections below, we present our analyses of the Mercy Maricopa PSH program using Mercy Maricopa’s Medicaid claims, and supplemented with stakeholder interviews. In concordance with the research questions, we examined who receives the services, how the services impact the member health care experience, the cost associated with members who use the services, and certain quality impacts.

Who receives the Scattered Site Housing subsidy?

Members in the Scattered Site subsidy program—the largest PSH program—were eligible for Medicaid and received the subsidy for an average of 7 months, or 2.3 quarters.\textsuperscript{15} In addition, the majority of members in the Scattered Site program were female (56%).\textsuperscript{16} Compared to enrollees in other Mercy Maricopa programs, Scattered Site program enrollees have a slightly higher average CDPS risk score, denoting a high burden of disease among this group. This is consistent with the program goals, as the Scattered Site subsidy targets chronically homeless individuals.

Exhibit 2 below shows the descriptive characteristics of members included in our analysis—both members enrolled in the Scattered Site intervention and the comparison group of matched members from the Scattered Site waiting list—with respect to demographics and health condition. All members of both groups were diagnosed with SMI. The two groups are similar in distribution of demographics and health, with the exception of age; members in the Scattered Site program were younger than the matched comparison group.

\textsuperscript{15} Under Mercy Maricopa’s PSH program, members sign a lease and pay 30 percent of their income towards rent, and the housing subsidy pays the remainder.

\textsuperscript{16} Throughout this report, unless otherwise noted, when we refer to Scattered Site program members, we are referring to the members in our Scattered Site program sample.
Exhibit 2: Descriptive Characteristics for Scattered Site Subsidy Members and Comparison Group Members

<table>
<thead>
<tr>
<th>Variable</th>
<th>Scattered Site Program</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Members from Q2 2014 to Q2 2017</td>
<td>606</td>
<td>606</td>
</tr>
<tr>
<td>Number of Unique Members from Q2 2014 to Q2 2017</td>
<td>606</td>
<td>237(^b)</td>
</tr>
<tr>
<td>Mean Number of Quarters Enrolled in Medicaid in Pre-Period [Range]</td>
<td>2.3 [1 - 4](^{***})</td>
<td>2.6 [1 - 4](^{***})</td>
</tr>
<tr>
<td>Gender % (N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>56.1 (340)</td>
<td>54.0 (327)</td>
</tr>
<tr>
<td>Male</td>
<td>43.9 (266)</td>
<td>46.0 (279)</td>
</tr>
<tr>
<td>Age % (N)(^*)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24 years</td>
<td>9.4 (57)</td>
<td>10.7 (65)</td>
</tr>
<tr>
<td>25-34 years</td>
<td>19.8 (120)</td>
<td>22.6 (137)</td>
</tr>
<tr>
<td>35-44 years</td>
<td>24.3 (147)</td>
<td>25.4 (154)</td>
</tr>
<tr>
<td>45-54 years</td>
<td>39.3 (238)</td>
<td>32.0 (194)</td>
</tr>
<tr>
<td>55-64 years</td>
<td>7.3 (44)</td>
<td>8.6 (52)</td>
</tr>
<tr>
<td>≥65 years</td>
<td>0 (0)</td>
<td>0.7 (4)</td>
</tr>
<tr>
<td>Race/Ethnicity % (N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>52.3 (317)</td>
<td>49.3 (299)</td>
</tr>
<tr>
<td>Black/African American</td>
<td>14.4 (87)</td>
<td>12.4 (73)</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>1.0 (6)</td>
<td>1.0 (6)</td>
</tr>
<tr>
<td>American Indian/Alaska Native</td>
<td>1.7 (10)</td>
<td>1.8 (11)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2.5 (15)</td>
<td>3.1 (19)</td>
</tr>
<tr>
<td>Other(^a)</td>
<td>28.2 (171)</td>
<td>32.7 (198)</td>
</tr>
<tr>
<td>Dual Eligible Status % (N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dually Eligible</td>
<td>2.8 (17)</td>
<td>2.6 (16)</td>
</tr>
<tr>
<td>Primary Language % (N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>97.0 (588)</td>
<td>98.0 (594)</td>
</tr>
<tr>
<td>Risk Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDPS Risk Score, Mean (Standard Deviation)(^a)</td>
<td>1.7 (1.1)</td>
<td>1.7 (1.0)</td>
</tr>
</tbody>
</table>

Note: \(^*p<0.10, \^{**}p<0.05, \^{***}p<0.01.\)
\(^a\) The Chronic Illness and Disability Payment System (CDPS) – a diagnosis and pharmacy based risk adjustment model – was used to account for differences in illness burden across the treatment and comparison groups. The CDPS risk score factors in an individual’s age, gender, cumulative diagnoses, and cumulative disease severity to create a value used for risk adjustment, a higher score from zero denotes a higher burden of disease.
\(^b\) Members in the Scattered Site Housing program were matched to those on the housing services wait list using propensity score matching with replacement, resulting in 237 unique comparison members being matched to 606 treatment group members. The comparison group sample size and descriptive statistics presented here incorporate frequency weights produced as a result of matching with replacement.
How do Scattered Site Housing subsidy and Permanent Supportive Housing services work?

During our interviews, stakeholders told us the impact on member health care experience was positive under Mercy Maricopa’s integrated model and the expansion of the housing subsidy and services. Specifically, stakeholders highlighted the importance of increased access to services and a new focus on member-centered care as contributing to the positive impact on member health care experience within the program. By integrating physical and behavioral health services and co-locating supportive housing services with other services provided in the clinics, members can now access the range of social, physical, and behavioral health services available to them. Stakeholders told us that the success of this approach results from the member-centric care model implemented by Mercy Maricopa, which is the central tenet of the plan’s approach to care.

Increased Access to Care

Across the board, stakeholders believed that integrating supportive housing services in clinics—and devoting more resources to, and expanding the capacity of, these services—has increased access to care for Mercy Maricopa members. Stakeholders, however, provided reflections and lessons learned about the integration and expansion of services at clinics, including their thoughts about the program impact of the increased number and types of stakeholders, the importance of retaining qualified staff, and the impact of a limited housing market on the ability of the program to fully achieve its goals.

Supported service integration

Obtaining comprehensive behavioral and physical health care that addresses complex needs is a challenging task for the vulnerable populations that Mercy Maricopa serves. However, the increased integration of a variety of services such as primary and behavioral health care, as well as housing support, has enabled members to access care more conveniently and at more points of entry.

Co-location of services within the clinics has permitted direct referrals from the clinical team to housing providers, facilitating the immediate receipt of a range of services and reducing the interruption that
occurs when patients must seek services from different sources and locations. Furthermore, service integration promotes communication among providers, allowing members to present to a provider with an issue and connect immediately with appropriate resources, even if those resources fall outside the scope of the initial request. For example, one primary care provider described a patient who arrived at a medical appointment in immediate need of substance abuse services. As a result of the integrated service model, which necessitates frequent communication between the primary care provider and other service providers, the medical provider was able to connect the patient with peer support, substance abuse services, and housing services within the hour. This enabled the member to receive support without risk of attrition from the program.

**Supportive housing subsidy and services expansion.** As the designated RBHA, Mercy Maricopa has been committed to fulfilling, and also exceeding, the requirements of the settlement for housing subsidy and services.

In addition to meeting the expansion thresholds mandated by *Arnold v. Sarn*, Mercy Maricopa, with the support of stakeholders, took the opportunity to leverage the work they were doing to push beyond the requirements in order to better meet members’ housing needs. By exceeding *Arnold v. Sarn* mandated targets, Mercy Maricopa and its partners showed a commitment to prioritizing member needs and a dedication to working with community stakeholders to ensure those needs were identified and addressed. For example, Mercy Maricopa continued to examine their data and talk to stakeholders about the merits of expanding the subsidy program, enabling 3,194 members with SMI who were previously experiencing homelessness to obtain housing since Mercy Maricopa became the RHBA in 2014.

In addition to expanding the subsidy, Mercy Maricopa also expanded PSH services, providing additional funding to help members with activities such as maintaining housing or creating a budget. For example, one program provides members who are at risk of an eviction with funding of up to $4,000 to ensure that they maintain their housing. This program acknowledges and addresses the disproportionately higher financial risk that unforeseen circumstances have on low-income individuals by providing a small buffer to support members when emergencies arise. Mercy Maricopa has also provided material support to individuals who recently obtained housing through start-up boxes, which consist of household items not yet covered by Medicaid that members may need to establish a home.
Member-Centered Model

Staff and stakeholders describe Mercy Maricopa’s approach to providing services as “member-centric.” In line with the SAMHSA Fidelity model, Mercy Maricopa follows a Housing First model for the PSH program, ensuring that members have full agency to obtain and direct their services and supports. To implement this strategy, Mercy Maricopa expanded staff in its Office of Individual and Family Affairs, bolstered its external relationships, and worked with providers on best practices that follow the Fidelity model. As a result of these internal efforts, Mercy Maricopa members have increased autonomy in directing their care, as evidenced by their ability to choose among providers and services.

Provider choice. Mercy Maricopa gives members a choice among providers throughout the continuum of care. When a member first enters the Mercy Maricopa program, they receive an assessment by the Crisis Response Network (CRN), during which CRN staff identify available providers closest to the member’s current housing from which the member can select. After a member makes this initial selection and begins receiving services at a particular contracted clinic, he or she can request a transfer to another clinic location at any time. This supports continuous access to care even if members move based on available housing or employment opportunities, and helps members find the right provider for their needs.

Service choice. Mercy Maricopa structures the services delivered through PSH to support the preferences and independence of each member. As Mercy Maricopa implemented and expanded adherence to the Fidelity model, providers who had initially focused on directing care reoriented to responding to the goals of the members.

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17 Mercy Maricopa adheres to the Substance Abuse and Mental Health Services Administration (SAMHSA) Fidelity model for their programs. SAMHSA defines fidelity as “the degree to which a program is implemented as its developer intended. If a program closely adheres to the original strategy, it’s more likely to replicate the positive outcomes of the program’s initial implementation or testing.” See https://www.samhsa.gov/capt/applying-strategic-prevention-framework/step5-evaluation/process-outcomes-evaluation.

18 Housing First is an approach to reducing homelessness that prioritizes housing above other less critical factors such as obtaining employment or maintaining sobriety. The Housing First model does not require individuals to address their behavioral health or substance use problems before being accepted.

19 In addition to the Mercy Maricopa Office of Individual and Family Affairs (OIFA), AHCCCS also maintains its own, separate OIFA.
Mercy Maricopa’s housing specialists follow the Housing First model. This approach requires providers to prioritize offering all homeless members housing options consistent with their needs and preferences. This represents a shift from prior models that limited access to housing support to members who achieved separate goals, such as remaining sober or keeping medical appointments. By framing housing as a tool for treatment rather than as an incentive, Mercy Maricopa’s housing services have enabled all members, including those with criminal backgrounds and active substance use disorders, to initiate the process of obtaining housing immediately, thereby encouraging members in their overall recovery.

**How does the Scattered Site Housing subsidy affect health care costs?**

Across varying lengths of Medicaid eligibility, members in the Scattered Site program—the largest PSH program—had total Medicaid costs of approximately $20,000 per member per quarter in the period prior to becoming enrolled in the Scattered Site program. This is higher than members in other Mercy Maricopa programs (such as supported employment and ACT). This high cost is likely due to the high-acuity and chronic homelessness of individuals who receive a housing subsidy through the Scattered Site program.

Individuals enrolled in the Scattered Site program experienced a statistically significant decrease in cost of care in the period after program enrollment compared to the period prior, driven partly by significant decreases in behavioral health costs (See Exhibit 3). Behavioral health professional services costs showed a relative decrease of 23 percent per member per quarter, and behavioral health facility costs showed a relative decrease of 46 percent. Inpatient behavioral health facility costs also showed a downward trend, but it was not statistically significant. We found no difference in physical health costs, including those for facility and professional health care claims, for members before and after they received a Scattered Site subsidy. Pharmacy costs remained virtually unchanged.

These outcomes do not account for secular trends, or factors outside of the program that might influence costs such as initiatives targeting the same population or unrelated changes in practice patterns. It is also important to note that these costs do not include the cost of the housing subsidy itself. In May 2017, a housing provider reported that a Department of Housing and Urban Development monthly subsidy was $735 for a one-bedroom apartment. The provider also noted that the amount paid for the Scattered Site program in Arizona, was recently adjusted to 110 percent of that amount, or $809 per subsidy for a one-bedroom apartment.
Exhibit 3: Cost of Care in the Pre and Post Period for the Scattered Site Subsidy Intervention Members, per Member per Quarter

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre-period ($)</th>
<th>Post-period ($)</th>
<th>Difference ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Cost of Care</strong></td>
<td>19611 [17320, 21902]</td>
<td>14988 [13836, 16140]</td>
<td>-4623 [-6506, -2740]</td>
</tr>
<tr>
<td><em>(facility, professional services, pharmacy)</em></td>
<td></td>
<td></td>
<td>-24%</td>
</tr>
<tr>
<td><strong>All Facility Costs</strong></td>
<td>6625 [5725, 7525]</td>
<td>4934 [4465, 5403]</td>
<td>-1691 [-2651, -731]</td>
</tr>
<tr>
<td>Facility cost: Physical health only</td>
<td>2263 [1135, 3391]</td>
<td>2252 [1793, 2711]</td>
<td>-12 [-1057, 1033]</td>
</tr>
<tr>
<td>Facility cost: Behavioral health only</td>
<td>4929 [4315, 5543]</td>
<td>2651 [2371, 2931]</td>
<td>-2277 [-2926, -1628]</td>
</tr>
<tr>
<td><strong>Inpatient Facility Cost</strong></td>
<td>1553 [687, 2419]</td>
<td>998 [770, 1226]</td>
<td>-555 [-1407, 297]</td>
</tr>
<tr>
<td><strong>Professional Services Costs</strong></td>
<td>7663 [7242, 8084]</td>
<td>6286 [5878, 6694]</td>
<td>-1377 [-1805, -949]</td>
</tr>
<tr>
<td>Professional services cost: Physical health only</td>
<td>1202 [1076, 1328]</td>
<td>1323 [1178, 1468]</td>
<td>121 [-11, 253]</td>
</tr>
<tr>
<td>Professional services cost: Behavioral health only</td>
<td>6556 [6154, 6958]</td>
<td>5047 [4665, 5429]</td>
<td>-1509 [-1926, -1090]</td>
</tr>
<tr>
<td><strong>Pharmacy Costs</strong></td>
<td>1793 [1437, 2149]</td>
<td>1871 [1642, 2100]</td>
<td>77 [-260, 414]</td>
</tr>
<tr>
<td><strong>Total Physical Health Costs</strong></td>
<td>3318 [2250, 4386]</td>
<td>3382 [2921, 3843]</td>
<td>64 [-1074, 1202]</td>
</tr>
<tr>
<td><em>(facility and professional services)</em></td>
<td></td>
<td></td>
<td>2%</td>
</tr>
<tr>
<td><strong>Total Behavioral Health Costs</strong></td>
<td>16921 [14098, 19744]</td>
<td>11047 [9369, 12725]</td>
<td>-5874 [-7434, -4314]</td>
</tr>
<tr>
<td><em>(facility and professional services)</em></td>
<td></td>
<td></td>
<td>-35%</td>
</tr>
</tbody>
</table>

Note: *p<0.10, **p<0.05, ***p<0.01.

Please note that because these results are adjusted (i.e., we adjust the statistical model to control for the influence of member characteristics, such as demographics), they will not add up within columns. This adjustment allows for a more precise estimate for the comparison and intervention groups that are not unduly influenced by secular trends. In addition, these estimates do not include the cost of the housing subsidy itself. In May 2017, a subsidy for a one-bedroom apartment was $809 per month.

We estimated the average quarterly impact of the intervention by comparing pre and post differences for members who received the Scattered Site housing subsidy and the comparison group in a difference-in-differences (DiD) analysis. Relative to the comparison group, members receiving a subsidy experienced a significant decrease in the total cost of care in the post-period. Specifically, we found that the total cost of care decreased by $5,000 per member per quarter for those individuals in the Scattered Site program relative to the comparison group. Total behavioral health costs decreased by $5,642 per member per quarter relative to the comparison group. Exhibit 4 below displays the full results for the average quarterly impact on cost for members enrolled in the Scattered Site subsidy program relative to the comparison group, across the observed enrollment period.
These findings are consistent with those of numerous other studies that have shown the benefits of providing a housing subsidy. For example, research from the Denver Housing First Collaborative (DHFC), a program designed to provide comprehensive supportive housing services to chronically homeless individuals with disabilities, found reductions in some hospitalization costs. Specifically, the program found that the total costs related to emergency services for the intervention population declined by more than 70 percent, or nearly $600,000, in the two years of participation in the supportive housing intervention compared to the two years prior to the intervention.

**Exhibit 4:** Cost of Care Outcomes for the Scattered Site Subsidy Intervention Members and the Matched Comparison Group, Difference-in-Differences Results, per Member per Quarter

<table>
<thead>
<tr>
<th>Variables</th>
<th>Intervention Difference ($)</th>
<th>Comparison Difference ($)</th>
<th>DiD Result ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Cost of Care</strong>&lt;br&gt;(facility, professional services, pharmacy)</td>
<td>-4623***&lt;br&gt;[-6506, -2740]&lt;br&gt;-24%</td>
<td>379&lt;br&gt;[364, 1122]&lt;br&gt;3%</td>
<td>-5002***&lt;br&gt;[-7052, -2952]</td>
</tr>
<tr>
<td><strong>All Facility Costs</strong></td>
<td>-1691***&lt;br&gt;[-2651, -731]&lt;br&gt;-26%</td>
<td>-418&lt;br&gt;[-1050, 214]&lt;br&gt;-7%</td>
<td>-1273*&lt;br&gt;[-2426, -120]</td>
</tr>
<tr>
<td><strong>Facility cost: Physical health only</strong></td>
<td>-12&lt;br&gt;[-1057, 1033]&lt;br&gt;-1%</td>
<td>-5&lt;br&gt;[-213, 203]&lt;br&gt;0%</td>
<td>-7&lt;br&gt;[-1072, 1058]</td>
</tr>
<tr>
<td><strong>Facility cost: Behavioral health only</strong></td>
<td>-2277***&lt;br&gt;[-2926, -1628]&lt;br&gt;-46%</td>
<td>-1969***&lt;br&gt;[-2624, -1314]&lt;br&gt;-35%</td>
<td>-308&lt;br&gt;[-1236, 620]</td>
</tr>
<tr>
<td><strong>Inpatient Facility Cost</strong></td>
<td>-555&lt;br&gt;[-1407, 297]&lt;br&gt;-36%</td>
<td>-234&lt;br&gt;[-762, 294]&lt;br&gt;-12%</td>
<td>-321&lt;br&gt;[-1334, 692]</td>
</tr>
<tr>
<td><strong>Professional Services Costs</strong></td>
<td>-1377***&lt;br&gt;[-1805, -949]&lt;br&gt;-18%</td>
<td>1016***&lt;br&gt;[643, 1389]&lt;br&gt;16%</td>
<td>-2394***&lt;br&gt;[-2967, -1821]</td>
</tr>
<tr>
<td><strong>Professional services cost: Physical health only</strong></td>
<td>121&lt;br&gt;[11, 253]&lt;br&gt;10%</td>
<td>149**&lt;br&gt;[30, 268]&lt;br&gt;15%</td>
<td>-28&lt;br&gt;[-202, 146]</td>
</tr>
<tr>
<td><strong>Professional services cost: Behavioral health only</strong></td>
<td>-1509***&lt;br&gt;[-1928, -1090]&lt;br&gt;-23%</td>
<td>801***&lt;br&gt;[457, 1145]&lt;br&gt;15%</td>
<td>-2311***&lt;br&gt;[-2860, -1762]</td>
</tr>
<tr>
<td><strong>Pharmacy Costs</strong></td>
<td>77&lt;br&gt;[-260, 414]&lt;br&gt;4%</td>
<td>550***&lt;br&gt;[340, 760]&lt;br&gt;52%</td>
<td>-473**&lt;br&gt;[-861, -85]</td>
</tr>
<tr>
<td><strong>Total Physical Health Costs</strong>&lt;br&gt;(facility and professional services)</td>
<td>64&lt;br&gt;[-1074, 1202]&lt;br&gt;2%</td>
<td>222&lt;br&gt;[-73, 517]&lt;br&gt;9%</td>
<td>-158&lt;br&gt;[-1336, 1020]</td>
</tr>
<tr>
<td><strong>Total Behavioral Health Costs</strong>&lt;br&gt;(facility and professional services)</td>
<td>-5874***&lt;br&gt;[-7434, -4314]&lt;br&gt;-35%</td>
<td>-230&lt;br&gt;[-862, 402]&lt;br&gt;-2%</td>
<td>-5645***&lt;br&gt;[-7364, -3926]</td>
</tr>
</tbody>
</table>

Note: *p<0.10, **p<0.05, ***p<0.01.
Models are adjusted for age, race, gender, English as primary language, dual eligibility, CDPS risk score, and enrollment throughout the entire quarter. Quarterly impact is defined as the average quarterly DiD estimate per quarter of program enrollment.
How does the Scattered Site Housing subsidy affect utilization-based measures of quality?

We examined changes in utilization rates in order to assess the impact of the Scattered Site housing subsidy program on quality of care. Specifically, inpatient medical and psychiatric hospitalizations, as well as outpatient ED visits, were compared across those enrolled in the Scattered Site Housing subsidy program and the comparison group.

Members enrolled in the Scattered Site program experienced no significant increases in inpatient medical hospitalizations and outpatient ED visits between when they enrolled in the subsidy program and after they began receiving the subsidy. However, they experienced a significant decrease in inpatient psychiatric hospitalizations of 95 per 1,000 members per quarter.

This decrease in psychiatric hospitalizations aligned with qualitative findings. Providers across several clinics reported noticing reductions in hospitalizations among clients who had secured housing. Exhibit 5 below presents the differences in quality measures associated with those individuals who enrolled in the Scattered Site Housing program intervention group before and after their receipt of the subsidy. These outcomes do not account for secular trends, or factors outside of the program that might influence costs such as initiatives targeting the same population or unrelated changes in practice patterns.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Housing Pre</th>
<th>Housing Post</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Inpatient Medical Episodes</strong> (per 1,000 members per quarter)</td>
<td>107 [81, 133]</td>
<td>124 [102, 146]</td>
<td>18 [-10, 46] 17%</td>
</tr>
<tr>
<td><strong>Number of Inpatient Psychiatric Episodes</strong> (per 1,000 members per quarter)</td>
<td>474 [411, 537]</td>
<td>379 [341, 417]</td>
<td>-95** [-162, -28] -20%</td>
</tr>
<tr>
<td><strong>Number of Outpatient ED Episodes</strong> (per 1,000 members per quarter)</td>
<td>1446 [1045, 1847]</td>
<td>1615 [1186, 2044]</td>
<td>169 [-36, 374] 12%</td>
</tr>
</tbody>
</table>

Note: *p<0.10, **p<0.05, ***p<0.01.

We estimated the average quarterly impact of the Scattered Site housing program by comparing pre and post differences for members enrolled in the Scattered Site housing program and the comparison group in a difference-in-differences (DiD) analysis. Relative to a comparison group, members in the Scattered Site program experienced no significant changes in utilization-based quality outcomes after receiving the subsidy.
Relative to the comparison group, those enrolled in the Scattered Site housing subsidy program averaged 155 fewer outpatient ED visits (per 1,000 enrollees) per quarter. However, this decrease in utilization was not statistically significant. Exhibit 6 below illustrates the Scattered Site subsidy program’s average quarterly impact on utilization based measures of quality relative to the comparison group.

These findings are consistent with several studies that have found that housing programs can reduce inpatient mental health care utilization, and tracking these differences over time may help us understand if these findings are sustained. Specifically, several studies showed greater reduction in the use of the hospital system for patients in supportive housing interventions compared to those in the comparison group who were receiving standard care. Furthermore, the literature suggests that supportive housing interventions result in a reduction in inpatient hospital stays for SMI individuals post-intervention.

Exhibit 6: Quality of Care Outcomes for the Scattered Site Subsidy Intervention Members and the Matched Comparison Group, Difference-in-Differences Results, per 1,000 Members per Quarter

<table>
<thead>
<tr>
<th>Variables</th>
<th>Housing Difference</th>
<th>Comparison Difference</th>
<th>DiD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Inpatient Medical Episodes (per 1,000 members per quarter)</td>
<td>18 [-10, 46] 17%</td>
<td>-14 [-40, 12] -12%</td>
<td>32 [6, 70]</td>
</tr>
<tr>
<td>Number of Inpatient Psychiatric Episodes (per 1,000 members per quarter)</td>
<td>-95** [-162, -28] -20%</td>
<td>-37 [-109, 35] -7%</td>
<td>-58 [-156, 40]</td>
</tr>
<tr>
<td>Number of Outpatient ED Episodes (per 1,000 members per quarter)</td>
<td>169 [-36, 374] 12%</td>
<td>324* [7, 641] 28%</td>
<td>-155 [-537, 227]</td>
</tr>
</tbody>
</table>

Note: *p<0.10, **p<0.05, ***p<0.01.
Quarterly impact is the average quarterly DiD estimate per quarter of program enrollment. Models are adjusted for age, race, gender, English as primary language, dual eligibility, CDPS risk score, and enrollment throughout the entire quarter.

What are the program considerations for the Permanent Supportive Housing program?

Stakeholders and Mercy Maricopa staff identified several lessons learned during the development and operation of the PSH program that may impact the success of member health care experience and their access to health care. These considerations included the importance of a strong partnership with a diverse group of stakeholders, and the need to address the challenges related to clinical staff retention, resource limitations on the program’s ability to provide the range of care and services required, the initial tension that came from adjusting to the Fidelity model, and complications that arise from coordinating inter-provider communication.
Diverse stakeholders and partnerships. Stakeholders and Mercy Maricopa staff believe diverse stakeholders and partnerships facilitated the integration and expansion of supportive services increased member access.

Mercy Maricopa proactively included input from a diverse set of voices to identify concerns and respond to community needs and concerns more quickly. For example, Mercy Maricopa has used the Vulnerability Index and Service Prioritization Decision Assistance Tool (VI-SPDAT) as a method for prioritizing the most vulnerable individuals on whom to spend scarce housing dollars. Staff explained that it was through meetings with housing stakeholders that the VI-SPDAT was identified as an important tool that could be used by Mercy Maricopa. Government officials noted that using the VI-SPDAT to prioritize highest-need individuals for housing helped cut the housing waitlist from nearly 1,600 individuals to 180, and enabled Mercy Maricopa to focus its efforts on providing housing vouchers and support services to the most vulnerable and chronically homeless individuals in the county. Among government partnerships, state, county, and city staff noted the importance of Mercy Maricopa’s participation in many different forums and coalitions, which strengthened its working relationship with government entities. For example, Mercy Maricopa holds quarterly meetings with supportive housing providers to educate them about various funding opportunities or update them about any upcoming changes. Additionally, stakeholders noted that the monthly community forums held for members and families are a useful way of engaging members and their support systems and educating them about available resources.

Mercy Maricopa also developed and leveraged robust relationships with providers and community advocates in order to increase members’ access to the full range of services available in the community. Providers noted how these relationships have strengthened the fabric of Maricopa County’s safety net for the SMI population and resulted in the more effective and strategic allocation of resources, pairing funding sources to multiply their impact. For instance, Mercy Maricopa worked with the City of Phoenix to establish funding partnerships; Mercy Maricopa provides Medicaid funds for housing support services to the city, and the city is then able to pair those services with the housing vouchers they provide to the

Member Perspective

By her early 40’s, Wanda had been in the SMI health care system for more than 15 years, struggling with both major depressive disorder and anxiety. Despite years of trying, it wasn’t until Mercy Maricopa took over as the RBHA that Wanda was able to access housing and supported employment services, which allowed her to overcome her criminal background to become a paralegal at a law firm. With the help of Mercy Maricopa’s set of supportive services, Wanda is now on her way to law school.
homeless, maximizing dollars allocated for the vouchers, which were previously underutilized due to lack of corresponding supportive services. These relationships have provided Mercy Maricopa with the necessary flexibility to directly address gaps in services noted by partners by diverting resources that otherwise would be used to pay for services already provided in the community.

Additionally, in response to feedback from partners, Mercy Maricopa dedicated Community Reinvestment Funds (5% of Mercy Maricopa’s profits) to housing for infrastructure and other housing supports. Providers noted that Mercy Maricopa has invested in higher-cost strategies as well—such as integrated clinical care programs—based on the recommendation of clinic providers as a way to strengthen the care provided to SMI clients.

Staff retention. Mercy Maricopa staff and stakeholders noted with some frustration, the frequent turnover of clinic staff, which impacts communication among providers and ultimately members’ access to care. High turnover among case managers is not unique to Mercy Maricopa, occurring across the mental health field nationally.\textsuperscript{xviii} The frequency of turnover may prevent clients from developing deeper relationships with their clinical team or from accessing the full array of services available to them. One housing specialist noted that she occasionally receives calls from case managers who are unaware of the role of a PSH provider. The coordination between the case manager and specialists is key to providing quality services, and since staff turnover is so frequent and rapid, it is difficult to ensure that providers, and therefore members, are aware of all available services.

Mercy Maricopa staff members acknowledge that case manager turnover is a challenge to the success of the program and is actively working to address the issue. In response, Mercy Maricopa required its providers to report on case management vacancy rates and enact plans to improve employee retention. Mercy Maricopa leadership is also addressing its own high turnover rates. Solutions include promoting a clinical mentorship program to provide ongoing coaching to case managers and returning to a more traditional model of clinical work where case managers have more frequent contact with supervisors. In addition, Mercy Maricopa staff are leveraging their relationship with its parent organization, Mercy Care Plan, and the Arizona Long Term Care System to determine the mechanisms these organizations have used in promoting staff retention among long-term care services providers, which have similar staff turnover issues.

Resource limitations. Housing resource limitations and other constraints continue to limit Mercy Maricopa’s ability to consistently provide the full scope of services to all members. However, Mercy
Maricopa has responded to market increases in rental prices by approving higher rents through reasonable accommodations requests and by partnering with housing providers to increase available housing options.

Severe housing shortages and rapidly increasing rents mean that dollars allocated for housing are unable to go as far. Members receiving the subsidy are also not as competitive as privately paying renters, given that their subsidy allocation (starting at $809 for a one-bedroom) does not meet market rate rental prices, which average well over $900 in many areas. Additionally, some landlords are hesitant to rent to individuals with a subsidy, especially those who may have unstable rental histories or criminal convictions. Members are finding that it takes longer to obtain housing in the current competitive housing market, even once they have a subsidy in hand, and apartments that are available at their price point are unsuitable given issues related to safety and location.

Furthermore, crime-free housing initiatives, which are increasingly prevalent in the Maricopa County region, shut out SMI individuals with any criminal background, further restricting available housing to this subgroup. These crime-free, drug-free initiatives partner with property owners, residents, and law enforcement officials to combat crime in multi-housing properties through a training and certification process. However, providers described an increase in property owners who do not have the formal crime-free certification, yet reject possible tenants with any criminal background on the basis of these initiatives. Although Mercy Maricopa and its partners are working to educate landlords about the benefits of housing members with SMI who are supported in maintaining their tenancy, it continues to be difficult for this population to access housing. A review of the literature surrounding similar social service integration programs revealed that programs that incorporate housing services often acknowledged the widespread shortages in available, affordable housing. This issue is a common obstacle faced by programs serving large numbers of high-risk, high-need individuals in need of housing. Housing specialists noted that they would like additional support from Mercy Maricopa in recruiting and educating new landlords in order to expand the market of available Scattered Site housing options.

Adjustment to Fidelity model. As Mercy Maricopa shifted to their member-centric approach and introduced SAMHSA’s Fidelity model (Housing First), alignment with these requirements proved especially challenging for service providers that used a different model previously. With the implementation of the Housing First model outlined in the Arnold v. Sarn settlement, providers had to adjust to a new organizational structure and a new way of thinking about supportive housing services. Providers described having to reorganize their ACT teams, given the new standards surrounding licensing and educational background, forcing some staff into lower-level positions or out of a job altogether.
Providers described philosophical adjustments in the shift to the Housing First model in addition to these structural changes. Mercy Maricopa staff also described difficult conversations with housing providers when the idea of supportive housing and the Housing First model were first implemented. Many housing providers in the community were offering housing services based on their own perceptions of a client’s readiness and were reluctant to recommend and deliver services that they felt were premature to the perceived readiness of the member. Initial Fidelity scores reflected this tension and led Mercy Maricopa to invest in robust educational efforts to shift providers’ perspectives towards the unconditional model of connecting members to housing, and Mercy Maricopa has seen resulting improvement in providers’ adherence to the member-centric model.

Inter-provider communication. Stakeholders noted that sharing patient information was another challenge to creating a member-centric approach to service delivery. Providers described facing resistance from clinic staff when joining their morning meetings, which serve as a discussion of each member’s status and ongoing needs. One provider noted that these meetings were largely crisis-driven in the past, and clinical staff had to adjust to the new focus on supportive housing services. In turn, supportive housing service providers believed they had to continue reminding clinical staff of the importance of supportive services in preventing crises and stabilizing members’ health. Despite some progress in fostering cooperation among providers involved in a member’s care, supportive housing service providers continued to experience challenges in obtaining pertinent information about the health needs of members or the services they were receiving. This is a likely byproduct of both HIPAA regulations and the technological constraints of data sharing. According to the literature, many programs integrating physical and behavioral health care with social support services experience difficulty sharing data, especially as it pertains to the exchange of beneficiaries’ health data.xxxi

Concluding Observations

Research on the Housing First model and supportive housing generally, confirm the assertion that such interventions can lead to reductions in costly inpatient hospital services for individuals with SMI. However, it remains challenging to attribute changes in health outcomes and cost savings specifically to the use of supportive housing. Furthermore, the interventions themselves often require significant costs, which may or may not be offset by these savings.

In the case of PSH, we found that members who had the Scattered Site housing subsidy experienced a significant decrease in the cost of care through reductions in costs related to behavioral health facilities and professional services. This reduction in costs for behavioral health facility costs relative to a
comparison group may offset the cost of the program itself based on what we know about the costs of the subsidy.

Qualitatively, stakeholders report that Mercy Maricopa succeeded in expanding access to PSH and services beyond the requirements of the *Arnold v. Sarn* settlement. Providers felt Mercy Maricopa’s commitment to implementing the evidence-based Housing First model, and their member-centric approach to care contributed to the success of the PSH programs and services. Our qualitative results point to several lessons that other states or health care systems may consider as they undertake the expansion of supportive housing services to the SMI population or determine how to prioritize populations for specific services. These lessons learned include the importance of making a commitment to member-centered care, establishing strong connections with a variety of stakeholders, and developing strategies to reduce staff turnover. Overall, our results are promising and suggest that further research with a larger sample conducted over a longer period of time would provide valuable information on the effectiveness of the PSH subsidy and services.
Appendix A: Quantitative Methods

Overview

This appendix offers an overview of secondary data collection for the NORC evaluation and further detail on our analytic methods. We provide details of our methods and describe Mercy Maricopa’s data sources and populations, measure specifications, and analytic models. We also detail results for our propensity score matching and difference-in-differences methods.

Data Sources

NORC received separate rosters from Mercy Maricopa to track individuals’ inclusion in the Scattered Site wait list, referral to a Scattered Site provider, and receipt of the Scattered Site subsidy.

Service Roster Excel files received:

We received the following documentation in Microsoft Excel format listing Mercy Maricopa members’ eligibility for and receipt of the Scattered Site subsidy:

- “Housing and Employment mem list”
- “PSH Services By Month 2016-2017”
- “PSH Subsidy By Month 2015-2017”
- “PSH AVS provider list”
- “Scattered Site Referrals” (updated October 2017)
- “Scattered Site Waitlist as of 10.5.17”

We received a “member demographic data extract” which supplies additional demographics information for Mercy Maricopa members. After cleaning the data, we found that only 56% of the Mercy Maricopa members in the Medicaid eligibility file had additional demographic data in the demographic file. We decided not to use this additional demographic data in our matching and analysis models in order to avoid reducing our sample to size to individuals with available demographic file data. The only source of demographic data used in this analysis is the less comprehensive data available in the Medicaid eligibility file, including variables such as gender, race, age, and primary language. As this information was used for propensity score matching, members with any missing demographic information in the Medicaid eligibility file were excluded from the analysis.
NORC received Medicaid claims files from Mercy Maricopa for its members. NORC used these files to identify data on cost and utilization related to Facilities (labeled by Mercy Maricopa as “Part A”), Professional Services (labeled by Mercy Maricopa as “Part B”), and Pharmacy claims for Mercy Maricopa’s SMI integrated care population. Medicaid files also included an “eligibility file” which lists member IDs included in the claims as well as dates of enrollment and demographic information.

**Medicaid claims CSV files received:**

We received a codebook and claims files split in CSV files by claim type. There was at least two quarters of data in each file. Date ranges for the files started in calendar year 2013 quarter four and went through calendar year 2017 quarter two.

- Facility “Part A” Header files (“header”)
- Facility “Part A” Revenue center files (“revctr”)
- Facility “Part A” Procedure files
- Facility “Part A” Diagnosis files
- Professional services “Part B” files
- Pharmacy files
- Provider files
- Member PCP file (one file for all dates)
- Eligibility file (one file for all dates)

**Analytic File Construction**

The PSH Scattered Site referral roster file provided by Mercy Maricopa contained 1,646 unique identifiers for members who were referred to the Scattered Site program. The PSH Scattered Site waitlist roster file contained 502 unique member identifiers for members on the Scattered Site program waitlist. We merged the roster files to distinguish between Mercy Maricopa members who were Medicaid eligible, had SMI, and were either eligible for the Scattered Site program but had not enrolled (comparison group), or who were enrolled in the program (treatment group). Next, we linked the merged roster files to the Medicaid eligibility file and restricted members to those who:

- Have a valid AHCCCS identifier in the Eligibility file
- Are part of the SMI integrated care Medicaid eligible population
- Have a program enrollment date after the first date of eligibility
- Are 18 years of age or older
- Had no missing demographic information (information available in both the Medicaid eligibility file including gender, race, primary language, dual eligibility status, and indicator of death)
Had at least one quarter of Medicaid eligibility and claims data available before and after their enrollment in the Scattered Site program.

After applying these restrictions, we identified 606 unique Mercy Maricopa Medicaid eligible members with SMI who were enrolled in the Scattered Site program during quarter two of calendar year 2014 to quarter two of calendar year 2017. To identify the comparison group, we included all members in the Scattered Site referral and waitlists who were not enrolled in the Scattered Site program during the analysis period. This yielded a comparison group with 365 unique Mercy Maricopa Medicaid eligible members with SMI who had housing needs but were not yet enrolled in the PSH subsidy program.

We identified Mercy Maricopa claims data for the members identified in the previous step and created a member-quarter file that included average cost and quality outcome measures for each calendar quarter from quarter two of calendar year 2014 to quarter two of calendar year 2017. Members without Medicaid eligibility over an entire quarter did not have data included for that particular quarter. For the treatment group, calendar quarters occurring prior to enrollment in the Scattered Site program were defined as the pre-period and calendar quarters occurring after enrollment in the program were defined as the post-period. For the comparison group, calendar quarters occurring prior to quarter two of calendar year 2015 were defined as the pre-period and the remaining quarters were defined as the post-period. We trimmed the study period for individuals in the comparison group whose number of pre- or post-intervention
quarters exceeded that of the individual in the treatment group it was matched to. This ensures that the treatment and comparison groups have similar pre and post period’s exposure length. Due to the sample size available in our analytic file we present claims outcomes in a per member per quarter basis to avoid issues with sample size when presenting claims outcomes in a per member per month basis.

Types of outcomes were identified based on the claims file in which the claim was recorded (either facility based or professional services). For costs, both facility based claims and professional services are further divided into physical and behavioral health categories by identifying categories of diagnosis codes in the claims. Facility based claims that originate from inpatient admissions are also identified by diagnosis codes and revenue codes and include both physical and behavioral health inpatient claims. For utilization, medical episodes, psychiatric episodes, and ED visits are identified using revenue codes.

We acquired data analysis code from the University of California, San Diego for the proprietary Chronic Illness and Disability Payment System (CDPS version 6.2). This code was used to provide a risk score for both ICD-9 and ICD-10 codes in each inpatient and outpatient claim occurring in the pre-period to calculate disease burden and severity experienced by each cohort in the pre-period. We utilized the CDPS risk score in the propensity score matching and analysis models to account for differences in illness burden across the treatment and comparison groups. We limited the member-quarter file to individuals in the treatment and propensity score matched comparison group to create the final member-quarter analytic file.

Study Population

Sampling Frame
Our analysis only considers individuals in the eligibility file with enrollment dates occurring after April 2014, the start of Mercy Maricopa’s services. Claims data was available from calendar year 2014 quarter two and calendar year 2017 quarter two.

Treatment Group
The treatment group included 606 unique Mercy Maricopa Medicaid eligible members with SMI who were enrolled in the Scattered Site program during quarter two of calendar year 2014 to quarter two of calendar year 2017. To be included in the treatment group, members had to be listed in the Scattered Site referral list, the PSH services roster, and the Eligibility file. In addition, eligible members needed to have at least one full quarter of data in the pre and post Scattered Site periods to be included in the analysis.

Comparison Group
The comparison group included 365 unique Mercy Maricopa Medicaid eligible members with SMI who were eligible for but not enrolled in the Scattered Site program during quarter two of calendar year 2014 to quarter two of calendar year 2017. To be included in the comparison group, members had to be listed in the Scattered Site wait list or the referral list, and the Eligibility file, but not the PSH services list. In addition, eligible members needed to have at least one full quarter of data in the pre and post Scattered Site periods to be included in the analysis.

**Propensity Score Matching**

We utilized propensity score matching with replacement to identify members in the comparison group with demographic and health characteristics that were similar to those in the Scattered Site program. The final resulting study sample included 237 unique propensity matched comparison group members and 606 treatment group members. The propensity score model included the following covariates: age, gender, race, primary language, dual eligibility status, pre-intervention CDPS risk score, and average quarterly total cost in the pre-period.

Exhibit A.1 shows the covariate balance and common support charts for the intervention and comparison groups before and after matching. In the matched sample, we obtain balance on all covariates. Also after matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups. Overall, the charts indicate that that propensity score matching greatly improved the comparability of the treatment and comparison groups.

To further demonstrate the effect of propensity score matching, Exhibit A.2 shows the standardized difference between covariates in the intervention and comparison groups before and after matching. A reduction in the standardized difference to an absolute value of under 0.1 indicates that the comparability of the intervention and comparison groups increased due to propensity score matching and improved the strength of our statistical analysis.

**Exhibit A.1: Balance and Common Support, Scattered Site Housing Subsidy Program Analysis**

| Balance before Matching |
**Exhibit A.2: Standardized Differences for Covariates Before and After Propensity Score Matching**

<table>
<thead>
<tr>
<th>Covariates used in match:</th>
<th>Scattered Site Program: Standardized Difference before Matching</th>
<th>Scattered Site Program: Standardized Difference after Matching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 18 to 24</td>
<td>-0.016</td>
<td>0.042</td>
</tr>
<tr>
<td>Age 25 to 34</td>
<td>-0.003</td>
<td>0.067</td>
</tr>
<tr>
<td>Age 35 to 44</td>
<td>-0.123</td>
<td>0.026</td>
</tr>
<tr>
<td>Age 45 to 54</td>
<td>0.132</td>
<td>-0.160</td>
</tr>
</tbody>
</table>
Study Design

Difference-in-Differences (DiD) Models

We use DiD methods to analyze program effectiveness. DiD models the difference in average outcome between the intervention and comparison group after implementation of the program minus the difference in average outcome between the intervention and comparison group before implementation of the intervention. This design allows us to estimate the treatment effect of the program while limiting the influence of selection bias (by using treatment and comparison groups pre- and post-intervention) and secular trends (by analyzing differences between two groups over the same period). Implementing a DiD design requires both a comparison group and pre- and post-intervention data.

For all analyses, we adjusted our DiD models for the following covariates: race/ethnicity, age, gender, English as primary language, dual eligibility, CDPS risk score, and a flag for a full quarter of enrollment. For utilization outcomes, we employed a population averaged Poisson model. For cost outcomes, we employed a generalized liner model (GEE) with log link function. All models except those for inpatient costs and behavioral health facility costs used a gamma distribution. The distributions of inpatient costs and behavioral health facility costs were skewed by a large number of zero dollar values therefore we applied a Gaussian distribution to those models.
All cost and utilization was considered zero if the value was missing in a claim for an individual with Medicaid eligibility. Prior to modeling, all cost variables were adjusted for inflation to 2017 numbers using the Producer Price Index (PPI) for General Medical and Surgical Hospitals.

Results for each step in the DiD model, for both adjusted and unadjusted models, are shown in Exhibit A.3 and A.4.

**Limitations**

There were several limitations to this study. Below, we list the limitations, their implications, and mitigation strategies, if any.

**Precise date of enrollment in the Scattered Site program is unavailable.** Mercy Maricopa provided monthly roster files that listed Mercy Maricopa members who received the Scattered Site subsidy. The post-period includes the first complete calendar quarter and all other calendar quarters occurring after the enrollment month. Any immediate impact (i.e. impact occurring within one to two months of enrollment) on health care costs and quality of care may not be reflected in the findings.

**A significant number of members who received the Scattered Site subsidy were excluded from the analysis due to missing data.** Of the 1,646 members listed in the Scattered Site roster files, only 606 members met the eligibility criteria to be included in the analysis. As a result of this exclusion, we are unable to estimate the impact of the Scattered Site program for all enrolled the members.

**Members enrolled in the Scattered Site program immediately after becoming eligible for the SMI program were excluded from the analysis.** To be included, members needed at least one quarter of enrollment in Mercy Maricopa in the periods before and after intervention enrollment. The data provided began in April 2014, when Mercy Maricopa became the RBHA. Members enrolled in the Scattered Site program immediately after (i.e., within one quarter) becoming eligible for the SMI integrated program were excluded from the analysis because we were unable to establish baseline cost and utilization levels due to limited pre-period.

**While all members have a need for housing services, the differences in level of housing need between the treatment and comparison groups is not accounted for.** Due to unavailability of VI-SPDAT scores for all members in the study population, the level of need for members in the treatment and comparison group is not measured. As a result, we were unable to quantify the extent to which the observed differences in outcomes are explained by differences in housing need across the treatment and comparison groups.
comparison groups. However, since all comparison group members were included in the Scattered Site wait list, they had at least some level of housing need. In addition, our propensity score matching methods did account for differences in illness burden and prior year cost of care—measures that were meant to account for differences in level of risk and total cost of care in the pre-period.

The Difference-in-Differences (DiD) analysis of some outcome measures did not meet the parallel trends assumption. The DiD analysis, which compares change in outcomes of members enrolled in the Scattered Site program to a matched comparison group, rests on the assumption that trends in the pre-period are parallel. Parallel trends are ones with similar relative changes over the entire study period, regardless of the starting point. When trends are not parallel over time, it can be assumed that something other than exposure to the program is affecting the difference in outcome. Although most outcome measures in this study met this parallel trends assumption, the following measure did not meet this assumption: Number of inpatient psychiatric episodes per 1,000 members. Pre-period trends for these outcomes for the treatment and the matched comparison group were not parallel, implying that outcomes for both groups are not affected in the same manner over time. To address this, our models use aggregate pre and post periods rather than individual calendar-quarters. The model, as specified, compares average outcomes aggregated across pre and post-period quarters for the treatment and comparison group. Therefore, the threat to internal validity arising from differential trends across quarters in the pre-period between the treatment and comparison groups is less of a concern.

### Exhibit A.3: Cohort Specific Unadjusted Means

<table>
<thead>
<tr>
<th>Scattered Site Program Quality Measures</th>
<th>Intervention PRE</th>
<th>Intervention POST</th>
<th>Intervention Difference</th>
<th>Comparison PRE</th>
<th>Comparison POST</th>
<th>Comparison Difference</th>
<th>DiD result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Inpatient Medical Episodes (per 1,000 members per quarter)</td>
<td>99</td>
<td>110</td>
<td>11 (10.61%)</td>
<td>124</td>
<td>104</td>
<td>-20 (-15.78%)</td>
<td>30</td>
</tr>
<tr>
<td>Number of Inpatient Psychiatric Episodes (per 1,000 members per quarter)</td>
<td>483</td>
<td>382</td>
<td>-102 (-21.02%)</td>
<td>672</td>
<td>524</td>
<td>-147 (-21.93%)</td>
<td>46</td>
</tr>
<tr>
<td>Number of Outpatient ED Episodes (per 1,000 members per quarter)</td>
<td>1038</td>
<td>1268</td>
<td>230 (22.14%)</td>
<td>1147</td>
<td>1601</td>
<td>454 (39.58%)</td>
<td>-224</td>
</tr>
</tbody>
</table>

20 Chronic Illness and Disability Payment System (CDPS)—a diagnosis and pharmacy based risk adjustment model—was used to account for differences in illness burden across treatment and comparison groups.
Scattered Site Program Cost Measures

<table>
<thead>
<tr>
<th></th>
<th>Intervention PRE ($)</th>
<th>Intervention POST ($)</th>
<th>Intervention Difference ($)</th>
<th>Comparison PRE ($)</th>
<th>Comparison POST ($)</th>
<th>Comparison Difference ($)</th>
<th>DiD result ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cost of Care (facility, professional services, pharmacy)</td>
<td>16581</td>
<td>13408</td>
<td>-3173 [-19.13%]</td>
<td>15585</td>
<td>15643</td>
<td>58 [0.37%]</td>
<td>-3230</td>
</tr>
<tr>
<td>All Facility Costs</td>
<td>7340</td>
<td>4697</td>
<td>-2643 [-36.01%]</td>
<td>7745</td>
<td>5474</td>
<td>-2271 [29.32%]</td>
<td>-372</td>
</tr>
<tr>
<td>Facility cost: Physical health only</td>
<td>2094</td>
<td>2059</td>
<td>-35 [-1.66%]</td>
<td>1625</td>
<td>1776</td>
<td>151 [9.26%]</td>
<td>-185</td>
</tr>
<tr>
<td>Facility cost: Behavioral health only</td>
<td>5247</td>
<td>2638</td>
<td>-2608 [-49.71%]</td>
<td>6120</td>
<td>3698</td>
<td>-2421 [-39.57%]</td>
<td>-187</td>
</tr>
<tr>
<td>Inpatient Facility Cost</td>
<td>1693</td>
<td>1133</td>
<td>-561 [-33.12%]</td>
<td>2440</td>
<td>1631</td>
<td>-809 [33.15%]</td>
<td>248</td>
</tr>
<tr>
<td>Professional Services Costs</td>
<td>7596</td>
<td>6972</td>
<td>-624 [-8.21%]</td>
<td>6840</td>
<td>8186</td>
<td>1346 [19.68%]</td>
<td>-1970</td>
</tr>
<tr>
<td>Professional Services cost: Physical health only</td>
<td>1152</td>
<td>1383</td>
<td>231 [20.03%]</td>
<td>940</td>
<td>1263</td>
<td>323 [34.40%]</td>
<td>-93</td>
</tr>
<tr>
<td>Professional Services cost: Behavioral health only</td>
<td>6444</td>
<td>5589</td>
<td>-854 [-13.26%]</td>
<td>5900</td>
<td>6923</td>
<td>1023 [17.33%]</td>
<td>-1877</td>
</tr>
<tr>
<td>Pharmacy Costs</td>
<td>1645</td>
<td>1739</td>
<td>94 [5.71%]</td>
<td>1000</td>
<td>1983</td>
<td>982 [98.22%]</td>
<td>-889</td>
</tr>
<tr>
<td>Total Physical Health Costs</td>
<td>3246</td>
<td>3442</td>
<td>196 [6.04%]</td>
<td>2565</td>
<td>3039</td>
<td>474 [18.47%]</td>
<td>-278</td>
</tr>
<tr>
<td>Total Behavioral Health Costs</td>
<td>11690</td>
<td>8228</td>
<td>-3463 [-29.62%]</td>
<td>12020</td>
<td>10621</td>
<td>-1399 [-11.64%]</td>
<td>-2064</td>
</tr>
</tbody>
</table>

Exhibit A.4: Cohort Specific Adjusted Results

Scattered Site Program Quality Measures

<table>
<thead>
<tr>
<th></th>
<th>Intervention PRE</th>
<th>Intervention POST</th>
<th>Intervention Difference</th>
<th>Comparison PRE</th>
<th>Comparison POST</th>
<th>Comparison Difference</th>
<th>DiD result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Inpatient Medical Episodes (per 1,000 members per quarter)</td>
<td>107 [81, 133]</td>
<td>124 [102, 146]</td>
<td>18 [-10, 46] [17%]</td>
<td>117 [93, 141]</td>
<td>103 [89, 117]</td>
<td>-14 [-40, 12] [-12%]</td>
<td>32 [-6, 70]</td>
</tr>
<tr>
<td>Number of Inpatient Psychiatric Episodes (per 1,000 members per quarter)</td>
<td>474 [411, 537]</td>
<td>379 [341, 417]</td>
<td>-95 [-162, -28] [-20%]</td>
<td>562 [495, 629]</td>
<td>525 [482, 568]</td>
<td>-37 [-109, -7%]</td>
<td>-58 [-156, 40]</td>
</tr>
<tr>
<td>Number of Outpatient ED Episodes (per 1,000 members per quarter)</td>
<td>1446 [1045, 1847]</td>
<td>1615 [1186, 2044]</td>
<td>169 [-36, 374] [12%]</td>
<td>1160 [931, 1389]</td>
<td>1484 [1267, 1701]</td>
<td>324 [7, 641] [28%]</td>
<td>-155 [-537, 227]</td>
</tr>
</tbody>
</table>

Note: Bolded numbers represent a statistically significant finding. The numbers in parenthesis represent the 90% confidence intervals.
### Scattered Site Program Cost Measures

<table>
<thead>
<tr>
<th></th>
<th>Intervention PRE ($)</th>
<th>Intervention POST ($)</th>
<th>Intervention Difference ($)</th>
<th>Comparison PRE ($)</th>
<th>Comparison POST ($)</th>
<th>Comparison Difference ($)</th>
<th>DiD result ($)</th>
</tr>
</thead>
</table>

Note: Bolded numbers represent a statistically significant finding. The numbers in parenthesis represent the 90% confidence intervals.
# Appendix B: Qualitative Codebook

<table>
<thead>
<tr>
<th>Code Family</th>
<th>Code</th>
<th>Definition/Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service type</td>
<td>Care integration</td>
<td>References to integrated services or other supportive or medical services in tandem</td>
</tr>
<tr>
<td></td>
<td>Court services</td>
<td>References to court services</td>
</tr>
<tr>
<td></td>
<td>Employment</td>
<td>References to employment services</td>
</tr>
<tr>
<td></td>
<td>Housing</td>
<td>References to housing services</td>
</tr>
<tr>
<td></td>
<td>Government (city, county, state)</td>
<td>Code entire interview to ID who was interviewee</td>
</tr>
<tr>
<td></td>
<td>MMIC staff</td>
<td>Code entire interview to ID who was interviewee</td>
</tr>
<tr>
<td></td>
<td>Service providers</td>
<td>Code entire interview to ID who was interviewee</td>
</tr>
<tr>
<td></td>
<td>Stakeholders (community advocate)</td>
<td>Code entire interview to ID who was interviewee</td>
</tr>
<tr>
<td>Background information</td>
<td>Background information</td>
<td>Descriptive information about programs and services or staff roles. Information should not be linked to an outcome or the development of the program.</td>
</tr>
<tr>
<td>Arnold v. Sarn</td>
<td>Arnold v. Sarn</td>
<td>Any information related to the Arnold v. Sarn legislative decision</td>
</tr>
<tr>
<td>Client stories</td>
<td>Client stories</td>
<td>Anecdotes about client experiences, may be cross-coded with Member Health care experiences</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Cost</td>
<td>Descriptions of outcomes related to cost</td>
</tr>
<tr>
<td></td>
<td>Member health care experience</td>
<td>Descriptions of outcomes related to the member healthcare experience</td>
</tr>
<tr>
<td></td>
<td>Quality of care</td>
<td>Descriptions of outcomes related to quality of care</td>
</tr>
<tr>
<td>Program challenges and gaps</td>
<td>Program challenges and gaps</td>
<td>Challenges with the services related to outcomes</td>
</tr>
<tr>
<td>Program successes</td>
<td>Program successes</td>
<td>Successes with the services related to outcomes</td>
</tr>
<tr>
<td>Case study</td>
<td>Data</td>
<td>References to data used to make decisions about the program</td>
</tr>
<tr>
<td></td>
<td>External factors</td>
<td>Any factors that influenced the expansion that came from outside Mercy Maricopa</td>
</tr>
<tr>
<td>Code Family</td>
<td>Code</td>
<td>Definition/Clarification</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Internal factors</td>
<td></td>
<td>Any factors that influenced the expansion that came from within Mercy Maricopa</td>
</tr>
<tr>
<td>Implementation challenges</td>
<td></td>
<td>Challenges in expanding the services</td>
</tr>
<tr>
<td>Implementation successes</td>
<td></td>
<td>Successes in the expansion of services (but not outcomes)</td>
</tr>
<tr>
<td>Stakeholders and roles</td>
<td></td>
<td>Organizations or individuals involved in the expansion</td>
</tr>
<tr>
<td>Sustainability and replicability</td>
<td></td>
<td>Comments related to the ability to mimic the program elsewhere or maintain the program</td>
</tr>
</tbody>
</table>
References


vi Substance Abuse and Mental Health Services Administration. (2016). Mental and Substance Use Disorders. [https://www.samhsa.gov/disorders](https://www.samhsa.gov/disorders)


ix Ibid.


xvii Ibid.

xviii Substance Abuse and Mental Health Services Administration.


Ibid.


