



# Denver Regional Accountable Health Community demonstration program outcomes: health care costs and utilization

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Analysis commissioned by the Denver Regional Council of Governments. Analysis conducted by Milliman staff including Stoddard Davenport, Jill Van Den Bos, Shelley Moss and Trevor McCord.

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## Executive summary

The Denver Regional Council of Governments commissioned Milliman, an independent risk management, benefits and technology firm, to examine the outcomes of the Denver Regional Accountable Health Community. The Denver Regional Accountable Health Community was established via a Center for Medicare and Medicaid Innovation grant through which DRCOG served as a bridge organization for a network of health care clinics and community-based services. The program was a demonstration project to test the use of standardized screening tools for health-related social needs and subsequently provide navigation support to connect eligible individuals with community resources.

In its analysis, Milliman examined:

1. The demographic characteristics of the population screened for health-related social needs through the program.
2. The health-related social needs program managers identified and individuals' eligibility for navigation or other resources.
3. Program outcomes, such as program opt-in rates for individuals eligible for navigation services.
4. The resolution status for identified health-related social needs.

The program's effect on health care service utilization and costs for individuals who received Denver Regional Accountable Health Community services.

Clinical partners and DRCOG navigators conducted 45,704 screenings for health-related social needs, including housing, food, transportation, public utilities and safety. Food was the need most commonly identified (26.2% of screened individuals), followed by housing (15.0%). Of all screened individuals, 10.4% were determined to be eligible for Denver Regional Accountable Health Community program navigation, and

27.4% had health-related social needs and were provided with resources but were not eligible for navigation. Clinical partners performed 82.5% of the screenings, and 17.5% of the screenings were performed by DRCOG navigators who started screening in late 2019 and added email screenings in early 2020.

Among program participants eligible for navigation, 68.8% had needs related to food security, and 49.8% had housing-related needs. Among participants screened more than once, most continued to have unresolved health-related social needs on subsequent screenings. Among those that continued to have needs in subsequent screenings, slightly more demonstrated new needs than a need initially identified and unresolved.

Opt-in rates varied by health-related social need and were highest for those with public utilities-related needs at 86.6%, and lowest for safety-related needs at 75.6%. Overall, 82.2% of the navigation-eligible participants opted in.

Milliman staff completed multiple analyses, both direct comparisons and regression analyses including control variables, to study the relationships among program variables, and between program variables and health care service utilization rates and costs this report will detail the results of the program's effect on health care service utilization and costs for individuals who received Denver Regional Accountable Health Community services.

On average, Denver Regional Accountable Health Community program participants tended to show lower health care service utilization within a year post-screening than they did in the year pre-screening. This effect may partially be driven by the benefits of their participation in the Denver Regional Accountable Health Community program, but likely also reflects some amount of regression to the mean (because participants were required to have two recent emergency department visits to qualify for navigation), and the impact of the COVID-19

pandemic on health care service utilization patterns for most populations. The post-screening period for many participants was after the beginning of the COVID-19 pandemic, which significantly reduced utilization across the health care system, generally. Such reductions happened regardless of program eligibility, opt-in status or whether health-related social needs were resolved or not.

Using a methodology that compares the changes in outcomes over time between participants in the Denver Regional Accountable Health Community and a comparison group, Milliman's analyses showed that Denver Regional Accountable Health Community program participants receiving services through the Sam Sandos Westside Family Health Center experienced fewer emergency department visits than would have been expected in the absence of the program. Milliman used a comparable population from a clinic that did not participate in the Denver Regional Accountable Health Community as the comparison group. Results from these analyses were mixed for other measures of health care service utilization and costs.

Robust measurement of program outcomes was significantly hampered by the COVID-19 pandemic and the significant changes it caused for the health care system, community resources and social safety nets. Screenings generated substantial data about the health-related social needs of program participants, many of whom had needs that the community providers were able to resolve.

## Introduction

This report serves as documentation of Milliman's analysis of the Accountable Health Community model's program outcomes, as part of the DRCOG demonstration project. DRCOG commissioned the report from Milliman to analyze the outcomes of the Denver Regional Accountable Health Community program funded by the Center for Medicare and Medicaid Innovation. The findings reflect the research of the authors; Milliman does

not intend to endorse any program or organization. This document describes the methodologies that Milliman's staff employed and the conclusions of their analyses, as well as some context and considerations relevant to the results.

## Background and scope

The Centers for Medicare and Medicaid Services developed its Accountable Health Communities model to address health-related social needs by establishing relationships between clinical and community-based services to facilitate better health outcomes through coordination of care for related sets of needs. The Center for Medicare and Medicaid Innovation had 28 participating organizations in the Accountable Health Community program throughout the U.S. (source: <https://innovation.cms.gov/innovation-models/ahcm>), including DRCOG, which managed the Denver Regional Accountable Health Community and served as its bridge organization. The program was funded through a five-year Accountable Health Communities alignment track cooperative agreement award of

\$4.51 million to develop and measure relevant results in the metro Denver area.

The Denver Regional Accountable Health Community model works with five Denver-area clinical partners that assess their clients' health-related social needs through a standardized AHC screening tool. Program participants that had at least one of the targeted health-related social needs (housing, food, transportation, public utilities or safety) and a minimum of two emergency department visits in the previous 12 months were eligible for services beyond the initial screening, including navigation to connect them with community resources to help address the identified need(s). Participants that had identified health-related social needs but were not eligible for navigation were provided with information on available community-based services.

Milliman used Denver Regional Accountable Health Community program data and Medicaid medical claims data for participants to analyze the following aspects of the program and its effects:

- An analysis of health care service utilization and cost-related outcomes, using multiple approaches including basic descriptive analyses, regression approaches and a difference-in-differences study comparing results over time for a clinic participating in Denver Regional Accountable Health Community with another similar clinic that did not participate.

Due to the timing of the program and the overlapping COVID-19 pandemic, assessing the outcomes associated with the Denver Regional Accountable Health Community program was difficult. This report will avoid that difficulty by reporting on utilization and cost results from the period of time before the onset of Covid-19 or the onset of the Public Health Emergency in both the United States and the State of Colorado. Further, Milliman staff measured health care service utilization and costs in three distinct time periods:

- Baseline: May 2017 to April 2018.
- Implementation: May to December 2018.
- Program: January to December 2019.

A federal disaster declaration was made on March 13, 2020 and in Colorado, public health and executive orders related to COVID-19 (<https://covid19.colorado.gov/public-health-executive-orders>) began in mid-March of 2020.

## Characteristics of health-related social need screenings

The Denver Regional Accountable Health Community completed 45,704 health-related social need screenings for 35,084 individuals from May 1, 2018, to Sept. 15, 2021. Figure 1 presents the baseline characteristics of the individuals screened by Denver Regional Accountable Health Community, including demographics, the identified health-related social needs, eligibility for navigation or resources and other program variables.

Overall, 10.4% of screenings resulted in identification of individuals eligible for navigation, 27.4% of screenings resulted in identification of individuals eligible for information on available resources and the remaining 62.2% did not identify any health-related social needs. Many screenings identified individuals as having multiple health-related social needs, of which food was the most common (identified on 26.2% of screenings). The average age of the participant population was 24.1 (standard deviation of 21.9) and many of the participants were children. Most of the screenings (82.5%) were conducted by navigators at clinical sites rather than through a DRCOG staff navigator. The majority of participants (75.4%) had a single screening, though a small number had as many as five.

**Figure 1: Descriptive information on the screened population**

Screening results table	Count	
Total screenings	45,704	
Identified health-related social needs	Count	Rate
Housing	6,864	15.0%
Food	11,960	26.2%
Transportation	5,719	12.5%
Public utilities	3,640	8.0%
Safety	538	1.2%
Denver Regional Accountable Health Community program eligibility cohort	Count	Rate
Navigation eligible	4,764	10.4%
Resources only	12,527	27.4%
Screened no needs	28,413	62.2%
Participant age	Mean	Standard deviation
Participant age (in years)	24.1	21.9
Sex	Count	Percent
Female	23,649	51.7%
Male	16,751	36.7%
<i>Not provided</i>	5,304	11.6%
Year of screening	Count	Percent
2018	7,885	17.3%
2019	14,945	32.7%
2020	12,298	26.9%
2021	10,576	23.1%
<i>* 2021 contains screening data only through Sept. 15, 2021</i>		
Number of screenings (by member)	Count	
One	26,466	
Two	6,786	
Three	1,676	
Four	142	
Five	14	

Please reference the “Methodology, data and assumptions” section of the Accountable Health Communities page at DRCOG’s website ([drcog.org/programs/area-agency-aging/accountable-health-communities](http://drcog.org/programs/area-agency-aging/accountable-health-communities)) for variable definitions for all figures.

## Analysis of health-related social needs

While Figure 1 provides the distribution of identified health-related social needs, both as totals and by type of screening, Figure 2 shows the distribution of health-related social needs among navigation-eligible participants.

Navigation-eligible screenings (those individuals with at least one health-related social need upon screening and a minimum of two self-reported emergency department

visits in the prior 12 months) constituted 10.4% of all screenings, with an average of 2.02 health-related social needs identified per screening. The rates of health-related social needs were higher in the navigation-eligible subpopulation because having at least one health-related social need was a requirement for selection into the group. The relative distribution of health-related social needs was similar to that of the study population as a whole with food as the most-identified need followed — in order — by housing, transportation, public utilities and safety. A small percentage of this subpopulation (5.6%) ultimately was not navigated, possibly explained by data or reporting differences.

**Figure 2: Descriptive information on navigation-eligible subpopulation**

Navigation-eligible screenings	Count	Percent of all screenings	
Total screenings	4,764	10.4%	
Total health-related social needs identified	9,646		
Health-related social needs identified by screening	Count	Percent of all screenings	Percent of all health-related social needs
Housing	2,371	49.8%	24.6%
Food	3,276	68.8%	34.0%
Transportation	2,197	46.1%	22.8%
Public utilities	1,282	26.9%	13.3%
Safety	250	5.2%	2.6%
Navigated but no health-related social need identifier	5	0.1%	0.1%
Navigation-eligible but not navigated	265	5.6%	2.7%



## Program impacts on health care service utilization and cost analysis

### Difference-in-differences analysis — Westside compared with Peña

In order to better account for the impact of the COVID-19 pandemic timing on measurement of the health care service utilization effects of the Denver Regional Accountable Health Community program, Milliman staff also used a difference-in-differences analysis to compare the experience of individuals who received care through a Denver Regional Accountable Health Community participating pediatric clinic with those receiving care through a similar pediatric clinic that did not participate in the Denver Regional Accountable Health Community. For their analysis, Milliman staff compared health care service utilization and cost metrics prior to the onset of the COVID-19 pandemic between individuals screened for health-related social needs at the Sam Sandos Westside Family Health Center, which participated in the Denver Regional Accountable Health Community, and a matched sample of individuals who received care from Denver Health's Peña Family Health Center, which did not participate in the Denver Regional Accountable Health Community. Milliman staff matched individuals screened for health-related social needs through Westside (cases) with individuals receiving care through Peña that were not screened for health-related social needs of similar ages, sexes and frequency of baseline emergency department visits (controls).

For these populations, Milliman staff measured health care service utilization and costs in three distinct time periods:

- Baseline: May 2017 to April 2018.
- Implementation: May to December 2018.
- Program: January to December 2019.

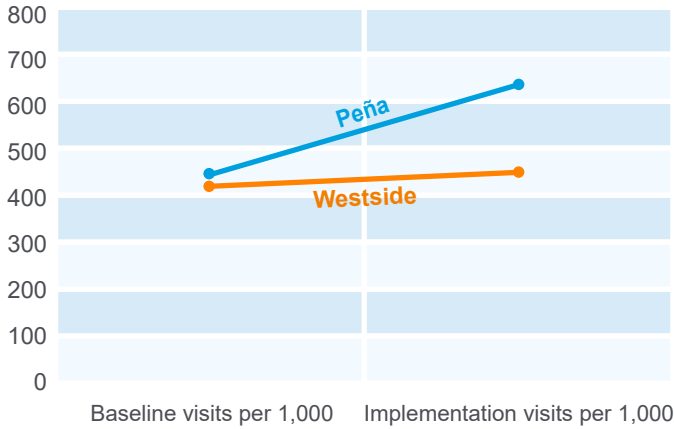
The dates selected for analysis were based on information provided to Milliman staff on August 24, 2021, indicating that Westside began implementing the Denver Regional Accountable Health Community screening and navigation process in May 2018, then went through four plan-do-study-act cycles by December 2018. Westside staff indicated they achieved consistency in the processes by January 2019.

## Utilization results

Milliman staff compared changes in health care service utilization and costs between cases and controls separately for the baseline and implementation periods, and between the baseline and program period. Figures 3 through 10 present the changes in health care service utilization rates between these time periods, separately for emergency department visits, inpatient admissions and physician office visits. A comparison between the baseline and implementation period appears on the left, and a comparison between the baseline and program periods appears on the right in the figures that follow.

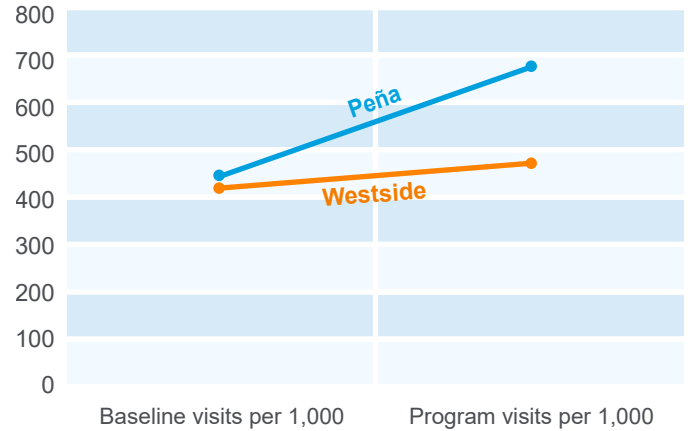
**Figure 3: Change in rate of emergency department visits per 1,000 population, baseline to implementation period.**

**Emergency department visits per 1,000**



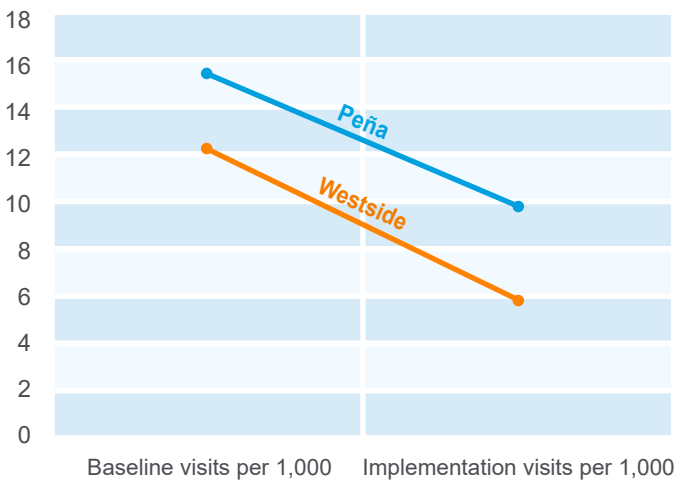
**Figure 4: Change in rate of emergency department visits per 1,000 population, baseline to program period.**

**Emergency department visits per 1,000**



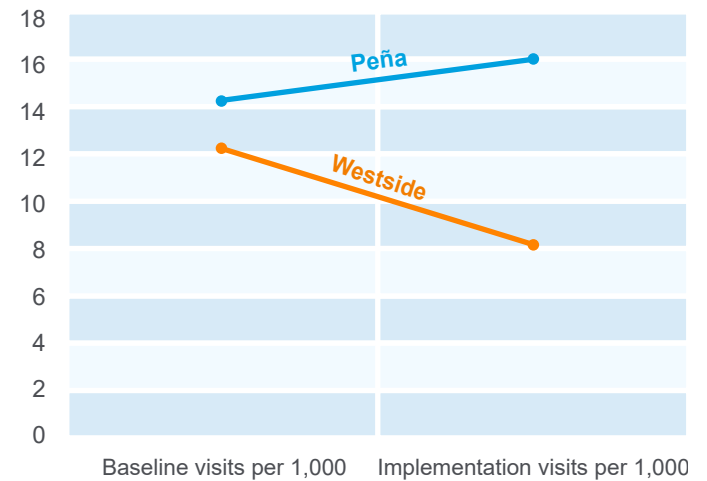
**Figure 5: Change in rate of inpatient visits per 1,000 population, baseline to implementation period.**

**Inpatient visits per 1,000**

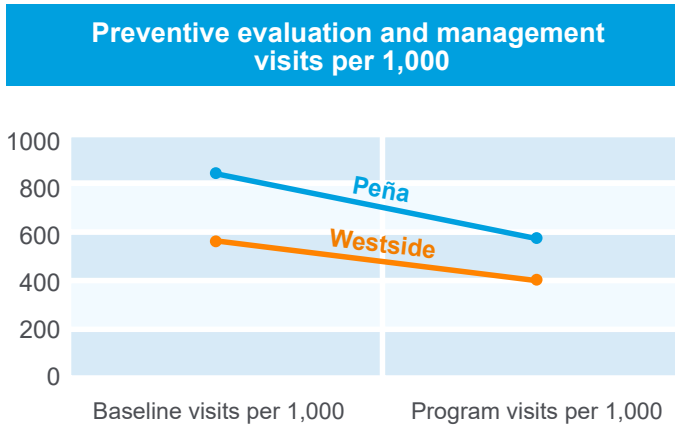


**Figure 6: Change in rate of inpatient visits per 1,000 population, baseline to program period.**

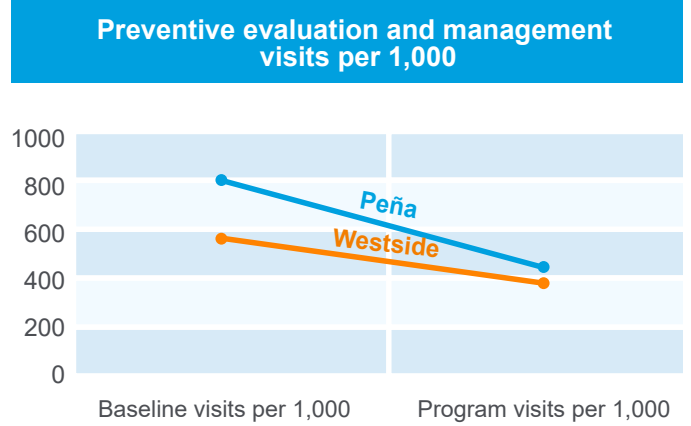
**Inpatient visits per 1,000**



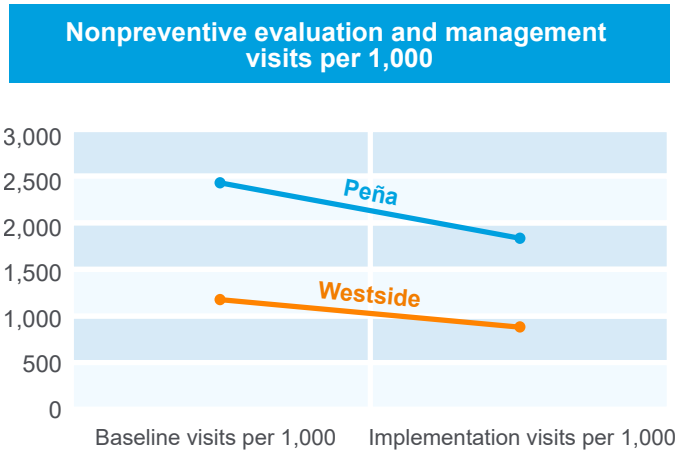
**Figure 7: Change in rate of preventive physician office visits per 1,000 population, baseline to implementation period.**



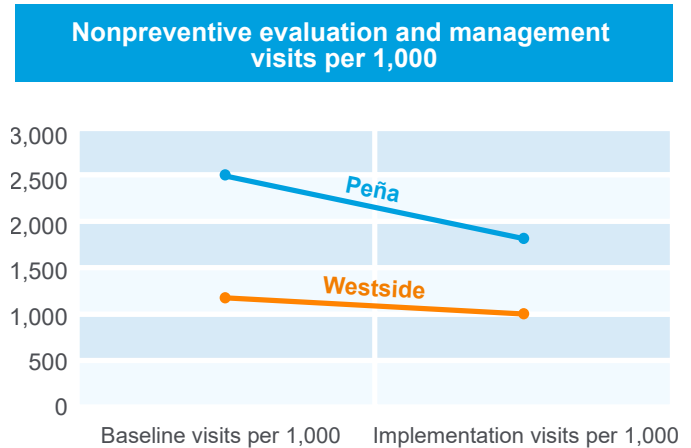
**Figure 8: Change in rate of preventive physician office visits per 1,000 population, baseline to program period.**



**Figure 9: Change in rate of non-preventive physician office visits per 1,000 population, baseline to implementation period.**



**Figure 10: Change in rate of non-preventive physician office visits per 1,000 population, baseline to program period.**



*For emergency department visits, the Peña clinic experienced a substantial increase in utilization rates from the baseline to program period, whereas the Westside clinic experienced smaller increases in utilization rates from the baseline to program period, indicating that the Denver Regional Accountable Health Community program was associated with fewer emergency department visits for Westside than would have been expected in the absence of the program.*

Figures 3-10 display the baseline, implementation and program period utilization rates per 1,000 participants per year for both Peña and Westside clinics. The charts can be used to compare the trend lines between the two clinics. In general Peña has higher baseline and program utilization than Westside. A difference-in-differences analysis assumes that the trend for the control group represents a reasonable proxy for the trend that the treatment group might have experienced in the absence of the intervention, so the effectiveness of the intervention is best visualized by evaluating differences in the slope of the lines between the Peña and Westside charts above. For emergency department visits, the Peña clinic experienced a substantial increase in utilization rates from the baseline to program period, whereas the Westside clinic experienced smaller increases in utilization rates from the baseline to program period, indicating that the Denver Regional Accountable Health Community program was associated with fewer emergency department visits for Westside than would have been expected in the absence of the program.

Conversely, the number of preventive and nonpreventive patient visits with a physician decreased from the baseline to program period, but utilization rates for these visits went down more for Peña than for Westside,

indicating that the Denver Regional Accountable Health Community program was associated with more physician office visits than would have been expected in the absence of the program. While trends were quite different between Westside and Peña for inpatient admissions, the frequency with which patients require inpatient care makes it challenging to draw statistically valid conclusions regarding the changes over time for this measure of utilization (see appendices for measures of significance). Improved health could be consistent with a decrease in use of the emergency department and inpatient care, while improved engagement with appropriate health care services could be consistent with increased usage of physician office visits as both replacements for emergency department visits and increased preventive care.

While the charts above provide a visual demonstration of the difference-in-differences analysis, the regression results in Appendix 1 (available at [drcog.org/programs/area-agency-aging/accountable-health-communities](https://drcog.org/programs/area-agency-aging/accountable-health-communities)) provide more detailed information on the parameter estimates and associated measures of statistical significance for the effects of individual and program characteristics on health outcomes over time.

## Cost results

In addition to the analysis of health care service utilization changes described above, Milliman staff also completed similar analyses on the difference-in-differences between trends for Peña and Westside clinics in health care costs, both on a per-member-per-month basis, as well as on a per-service basis. Similar to the utilization analysis, Milliman staff ran two sets of regressions, one for differences in health care costs between the baseline period and the implementation period, and one for differences in health care costs between the baseline period and the program period. Costs on a per-member-per-month basis reflect the combined effect of differences in both health care service utilization rates and costs per service, while costs on a per-service basis isolate the effect of differences in prices or intensity of services. Milliman staff completed separate analyses for the costs associated with emergency department visits, inpatient admissions, and physician office visits, as well as costs for all health care services in total. Costs per visit aren't

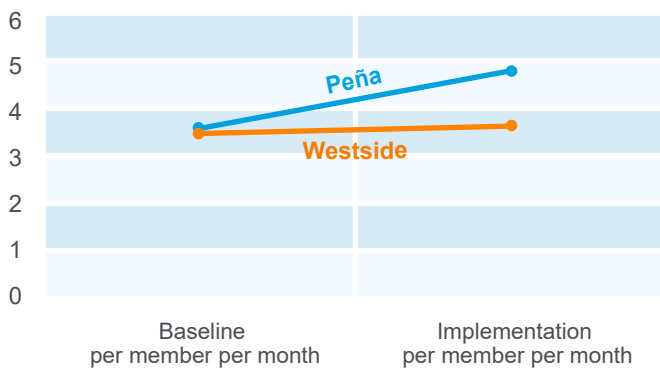
additive across service types due to differences in the units that constitute a service or "visit," but per-member-per-month costs can be added across all services, so Milliman staff also analyzed total per-member-per-month costs. Figures 11-24 present the analyses of differences in medical costs between baseline and implementation periods, and between baseline and program periods, with charts for costs on a per-member-per-month basis presented in the left column, and costs on a per-service basis presented in the right column.

Figures 11 through 18 illustrate the baseline and implementation period costs measured both as costs per member per month and average costs per service for both Peña and Westside for each of the three analyzed service categories and in total.

Figures 19 through 24 illustrate the baseline and program period costs measured both as costs per member per month and average costs per service for both Peña and Westside for each of the three analyzed service categories and in total.

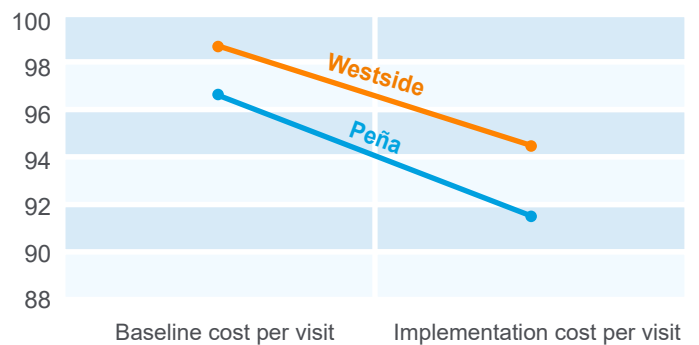
**Figure 11: Change in emergency department cost per member per month, baseline to implementation period.**

**Emergency department cost per member per month**



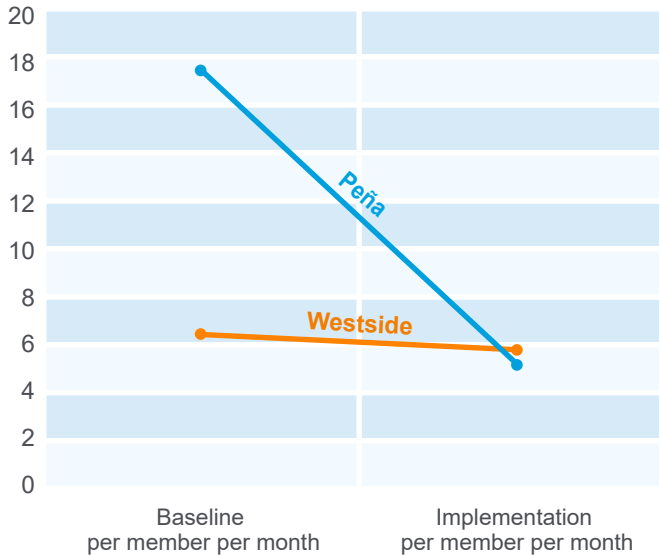
**Figure 12: Change in emergency department cost per visit, baseline to implementation period.**

**Emergency department cost per visit**



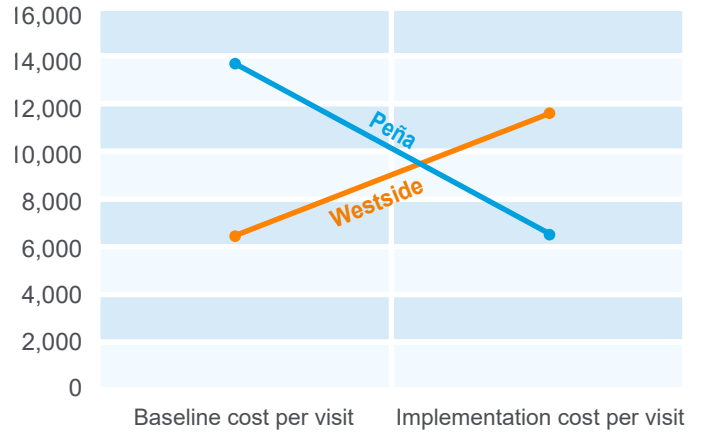
**Figure 13: Change in inpatient cost per member per month, baseline to implementation period.**

**Inpatient cost per member per month**



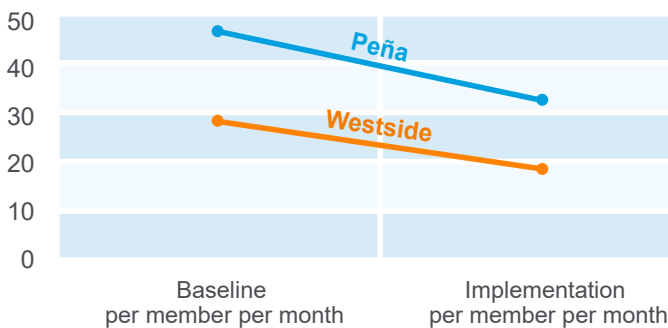
**Figure 14: Change in inpatient cost per visit, baseline to implementation period.**

**Inpatient cost per visit**



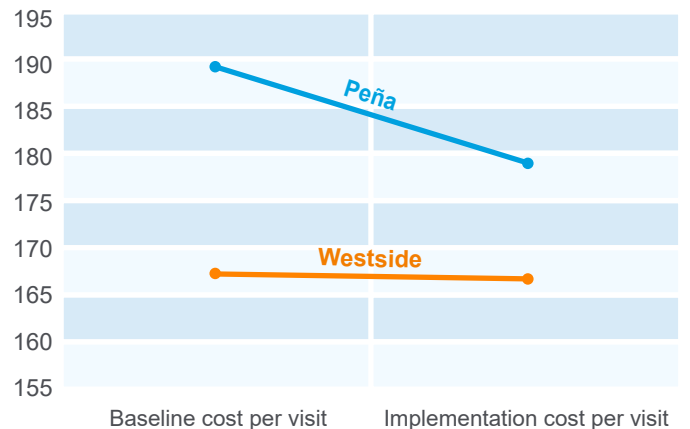
**Figure 15: Change in physician visit cost per member per month, baseline to implementation period.**

**Evaluation and maintenance cost per member per month**



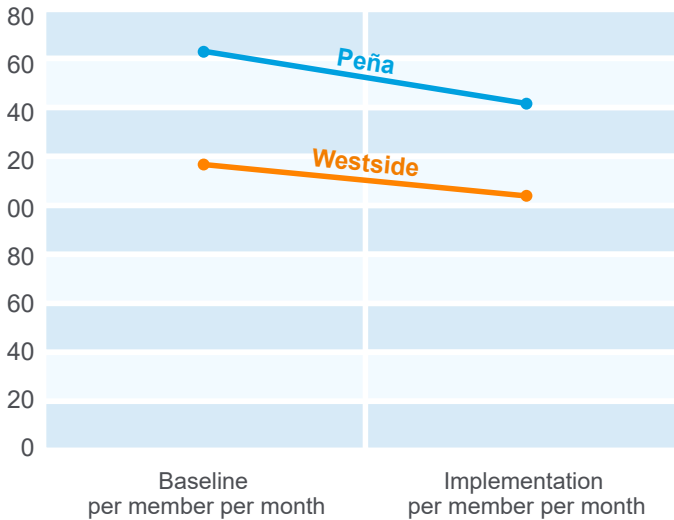
**Figure 16: Change in physician visit cost per visit, baseline to implementation period.**

**Evaluation and maintenance cost per visit**



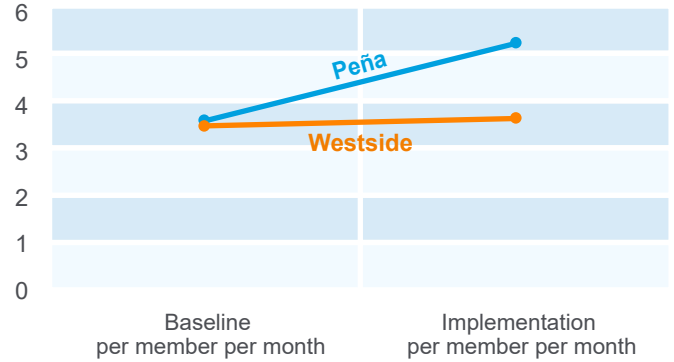
**Figure 17: Change in total cost per member per month, baseline to implementation period.\***

**Total cost per member per month**



**Figure 18: Change in emergency department cost per member per month, baseline to program period.\***

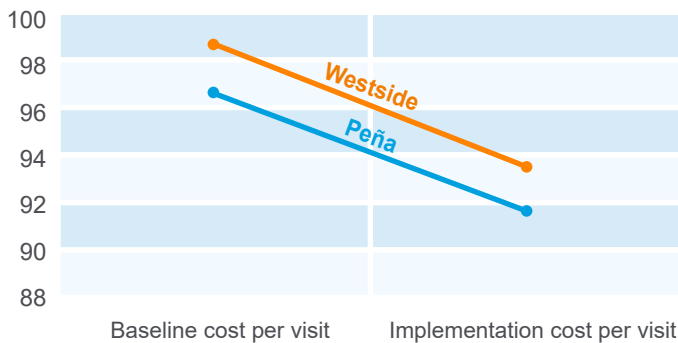
**Emergency department cost per member per month**



\* Figures 17 and 18 represent distinct data that, unlike other paired figures in this document, are not meant to be compared with each other.

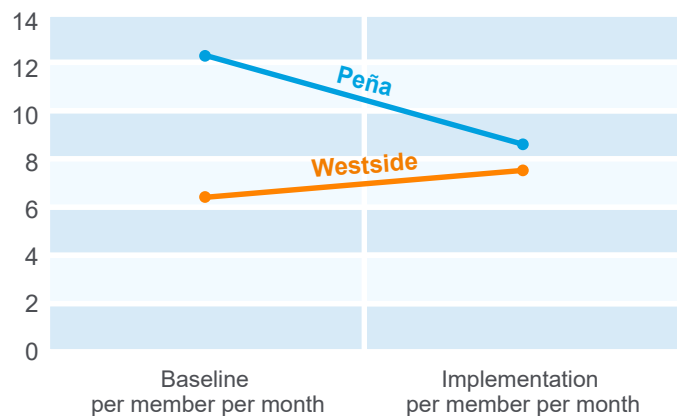
**Figure 19: Change in emergency department cost per visit, baseline to program period.**

**Emergency department cost per visit**



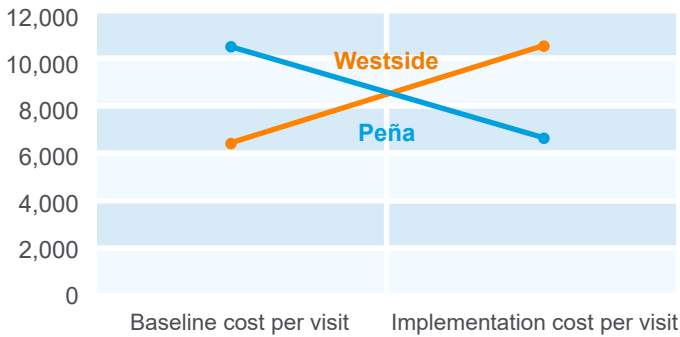
**Figure 20: Change in inpatient cost per member per month, baseline to program period.**

**Inpatient cost per member per month**



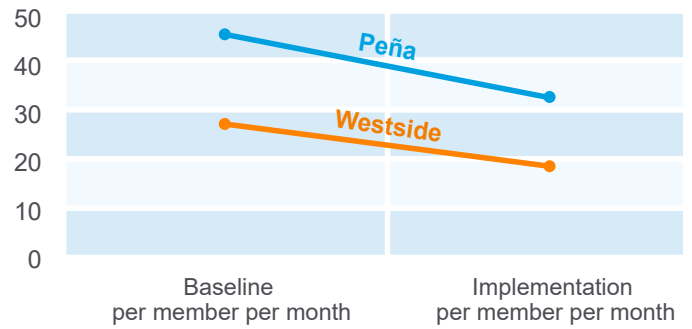
**Figure 21: Change in inpatient cost per visit, baseline to program period.**

**Inpatient cost per visit**



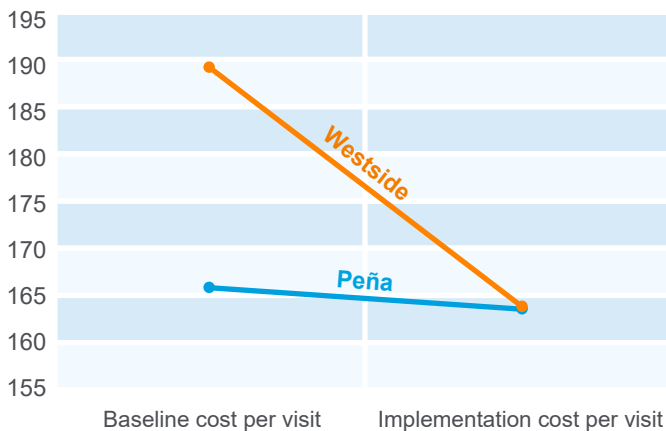
**Figure 22: Change in physician visit cost per member per month, baseline to program period.**

**Evaluation and maintenance cost per member per month**



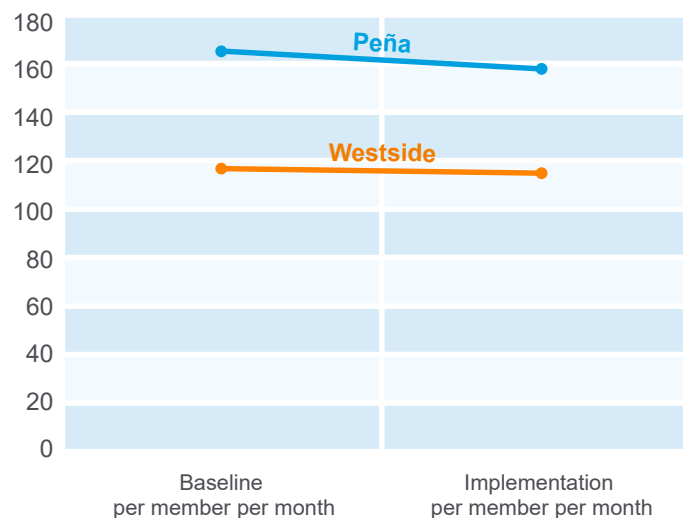
**Figure 23: Change in physician visit cost per visit, baseline to program period.**

**Evaluation and maintenance cost per visit**



**Figure 24: Change in total cost per member per month, baseline to program period.**

**Total cost per member per month**





In general, baseline and program costs per member per month were higher for Peña than Westside, while the costs per service tended to be higher for Westside (except for baseline inpatient costs). In a difference-in-differences analysis, the trend for the control group (Peña) represents the trend that would have been expected for the control group (Westside) in the absence of the intervention (Denver Regional Accountable Health Community program), and conclusions are best drawn by comparing the trend (or slope) between the two clinics over time. Milliman staff found that Peña experienced a substantial increase in emergency department costs per member per month, while Westside experienced a smaller increase in emergency department costs per member per month in the program period, indicating that Westside experienced lower emergency department costs per member per month than would have been expected in the absence of the Denver Regional Accountable Health Community program. Trends in emergency department costs per visit were similar for Peña and Westside, suggesting that cost avoidances can be mostly attributed to differences in emergency department utilization, rather than differences in cost per visit.

For physician office visits, both Peña and Westside saw decreases in costs per member per month from the baseline to program period – though the decrease was more substantial for Peña than for Westside. While both clinics also saw reductions in the average cost per physician visit, the decrease was far more substantial for Westside than for Peña, suggesting that the decrease in cost per member per month was driven by a significant decrease in the average cost per visit for Westside, whereas it was driven by a significant decrease in utilization for Peña.

Milliman staff also analyzed the changes in inpatient costs per member per month and per visit, but as with the utilization results, changes in inpatient results were not statistically significant due to the overall low frequency with which inpatient care is sought for a pediatric population (measures of significance can be found in Appendix 2 (available at [drcog.org/programs/area-agency-aging/accountable-health-communities](https://drcog.org/programs/area-agency-aging/accountable-health-communities)).

While figures 21-25 provide help visualizing the difference-in-differences analyses, more robust measures of program effects for the implementation and program years are provided through regression analyses, the results of which are presented in Appendix 2, respectively.

*Westside experienced lower emergency department costs per member per month than would have been expected in the absence of the Denver Regional Accountable Health Community program. Trends in emergency department costs per visit were similar for Peña and Westside, suggesting that cost avoidances can be mostly attributed to differences in emergency department utilization, rather than differences in cost per visit.*



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