Evaluation of the Medi-Cal Medically Tailored Meals Pilot Program

FINAL REPORT

California Code, Welfare and Institutions Code - WIC § 14042.1

December 14, 2023

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Acknowledgement

To obtain a copy of the Evaluation of the Medically Tailored Meals Pilot Program Final Report please mail requests to:

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Executive Summary

Medically tailored meals are designed to help meet the medical needs of people living with severe illness. The Medi-Cal Medically Tailored Meals (MTM) Pilot Program was a nutritional intervention that delivered medically tailored meals to the homes of Medi-Cal beneficiaries with a diagnosis of congestive heart failure. The program launched on April 1, 2018, and aimed to engage 1,413 beneficiaries in eight counties in California by December 31, 2021. Beneficiaries enrolled in the program received the following services:

1. **Medically tailored meals.** Enrolled beneficiaries received three meals per day delivered to their homes for 12 weeks. The meals were designed to help meet the medical needs of congestive heart failure patients. Meal delivery personnel also conducted wellness checks while delivering.

2. **Medical nutrition therapy.** Program participants received four sessions of medical nutrition therapy (MNT) with a registered dietitian, either in person or over the phone, to discuss individual dietary and nutritional needs.

3. **Case management and community referral.** Beneficiaries were engaged in program case management and referred to community-based resources as needed.

The MTM pilot program was intended to improve health outcomes and reduce health care expenditures for beneficiaries with congestive heart failure. In particular, the program aimed to reduce the use of high-cost acute and post-acute care services: emergency department visits, inpatient stays, and skilled nursing facility stays. By ensuring beneficiaries with congestive heart failure who had recently experienced an acute health event received medically appropriate food, the program could have a direct effect on participants' diet-sensitive health conditions. Additionally, providing meals could reduce food and income insecurity and decrease the burden associated with planning and preparing meals. This would free up resources that could be used for medications or other expenses. These additional resources could, in turn, enable participants to spend more time and energy recovering from an acute event and engaging in healthy behaviors, such as following prescribed medicine regimens and maintaining regular contact with outpatient health care providers. Finally, the meals constituted a concrete illustration of healthful eating that, along with the nutritional therapy, could help educate beneficiaries about nutritional management of congestive heart failure and set them up for long-term dietary change.

The pilot program funded six community-based agencies, which are part of the California Food is Medicine Coalition, to administer the program in eight counties in California. Project Open Hand administered the program in San Francisco and Alameda Counties, ensured program compliance and fiscal integrity, and subcontracted with five other agencies—the Ceres Community Project, Food for Thought, Health Trust, Mama's Kitchen, and Project Angel Food—to implement the program in the other counties.

A.   Evaluation

The goal of this evaluation is to determine the causal impacts of the MTM pilot program on health care use and health outcomes for beneficiaries with congestive heart failure. The final evaluation report includes the health care utilization and health outcomes of 783 beneficiaries

who had enrolled in the pilot program as of April 9, 2021 and interview and focus group responses from beneficiaries enrolled through April 2022 (referred to as MTM participants in this report).[1] Through the implementation evaluation Mathematica explored participant experiences, systematically described program implementation, and identified promising practices. This report covers five main topic areas 1) health care utilization; 2) health outcomes; 3) participant experience; 4) pilot program processes and infrastructure; and 5) promising practices.

B. Findings

Mathematica found strong evidence that the MTM pilot program increased the number of prescriptions participants filled by 6.6 percent over the first year and increased participants' visits to outpatient primary care and specialist providers by 13 percent in the first quarter of the follow-up period. These results are consistent with the hypothesis that participating in the MTM pilot program would encourage regular engagement with non-acute care medical services. Impacts tended to be largest in the three months when beneficiaries were receiving meals and MNT.[2] MTM pilot program participants also reported positive experiences with meal delivery, gave high ratings for the food quality, and generally valued working with dietitians. Many participants believed the program prepared them for lasting change.

Mathematica did not find sufficient evidence to suggest that the MTM pilot program reduced high-cost acute care use, such as emergency department visits or inpatient stays. The evaluation found evidence that participants in the MTM pilot program spent 53 percent fewer days hospitalized with a primary diagnosis of congestive heart failure in the first two quarters of the follow-up period (0.11 fewer days per beneficiary per quarter), although these stays accounted for about 10 percent of overall inpatient days. The study found mixed evidence that the MTM pilot program may have reduced the length of stay in a skilled nursing facility, but due to lack of consistency with other skilled nursing facility outcomes, no conclusions could be drawn from that evidence. The study could not indicate strong conclusions about the number of skilled nursing facility stays or length of such stays because skilled nursing facility encounters were rare among MTM pilot program participants.[3].

Implementation was generally smooth, even during the Coronavirus disease 2019 (COVID-19) pandemic that necessitated several changes to protocol. Agencies generally built or relied on existing partnerships with local providers or hospitals who referred eligible beneficiaries. Agencies would then reach out to enroll candidates and complete intakes by assessing their baseline health, potential challenges to participation (for example, housing insecurity) and knowledge of heart healthy diets. After enrollment, the agency connected the participants with their staff dietitian and started meal deliveries. However, the implementing agencies reported that recruitment and participant attrition were major challenges. Efforts to establish outreach activities in local communities improved recruitment in the second year of the pilot program. Agencies reported that some participants were unwilling to attend MNT sessions, which were a required element of the program. In some cases, agencies were able to encourage participants to attend MNT sessions through persistent outreach. Agencies also described screening

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[1] Beneficiaries who enrolled in the MTM pilot program on April 10, 2021 or later did not have sufficient claims runout (six months) to be observable in the follow-up period for a minimum of three months.
[2] The evaluators did not find significant impacts over longer time horizons, but the analysis was limited by sample attrition due to beneficiary mortality and exit from the Medi-Cal program.
[3] Only 5.1% of enrollees had any SNF stays in the baseline year.

potential participants for their readiness for the program's required MNT sessions and willingness to adjust to a new diet in order to maximize retention and engagement with the pilot program.

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I. Issue Statement

Medically tailored meals are designed to help meet the medical needs of people living with severe illness and are delivered to recipients through a referral from a medical provider or health care plan (Food is Medicine Coalition n.d.). Medically tailored meals are drawing increased interest nationwide[4] as an intervention that could potentially improve health outcomes, lower medical expenditures, and increase patient satisfaction. Over the past five years, several studies have assessed the effectiveness of medically tailored meals in various locations across the country, with many showing promising impacts on target outcomes (Center for Health Law and Policy Innovation of the Harvard Law School, 2020). In California, provider agencies affiliated with the California Food is Medicine Coalition delivered 1.8 million medically tailored meals in 2019 and 3.3 million in 2020 to individuals in California as part of the MTM Pilot Program. About half of clients served by California Food is Medicine Coalition agencies are people of color, and over half are living in poverty (Pedroza-Tobias, 2021).

In partnership with medically tailored meals providers, several California health plans, including the Central California Alliance, Anthem, and Blue Cross Blue Shield, are implementing and evaluating these interventions for their members (California Food is Medicine Coalition, 2021). MTMs can also be reimbursed under the California Advancing and Innovating Medi-Cal (CalAIM) initiative, which aims to improve quality of life and health outcomes for California's Medicaid program (Medi-Cal) beneficiaries through delivery system, program, and payment reform initiatives. These initiatives include whole-person, integrated care, and addressing social determinants of health [Department of Health Care Services (DHCS) 2021a, 2021b]. The CalAIM initiative, launched in January 2022, allows Medi-Cal managed care plans to offer Community Supports, which are cost-effective alternatives to traditional medical services or settings. These Community Supports include medically supportive food and medically tailored meals. At least one managed care plan in each of 46 counties offered medically supported nutrition or medically tailored meals as of June 2022, and the remaining 12 counties planned to start offering these services through at least one managed care plan as of July 2022. Out of 106 total Medi-Cal managed care plan by county combinations, 86 (81.1 percent) offered medically supportive food or medically tailored meals as of June 2022, 15 (14.2 percent) planned to offer services in the future, and 5 (4.7 percent) did not offer these services or plan to do so in the future (DHCS, 2022).

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[4] For example, the North Carolina Medicaid Healthy Pilots Program includes reimbursement for medically tailored meals (North Carolina Department of Health and Human Services, 2022).

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II. Background Section

> **Key takeaways**
>
> - The Medi-Cal MTM pilot program that launched on April 1, 2018, was a nutritional intervention that enrolled Medi-Cal beneficiaries with a diagnosis of congestive heart failure.
>
> - Beneficiaries received 12 weeks of home-delivered medically tailored meals, up to 4 medical nutrition therapy sessions with a registered dietitian, and case management and referral to community-based resources.
>
> - Participating agencies have substantial experience delivering meals to people with serious illnesses. They vary in the number of weekly deliveries they make to each participant, whether they deliver fresh or frozen food, and whether they prepare food on site or purchase it from a vendor.
>
> - Pilot program counties differ in some important ways from the rest of California and the United States as a whole. Pilot counties tend to be more densely populated, have greater proportions of foreign-born or foreign language–speaking residents, and have higher median household incomes.
>
> - Peer-reviewed studies using observational data have found large reductions in emergency department visits, inpatient stays, and skilled nursing facility stays. However, a recently published randomized controlled trial based in Alameda County, California, found no statistically significant reductions for emergency department visits or inpatient stays.

A. Pilot program

The Medi-Cal MTM pilot program was a nutritional intervention targeting Medi-Cal beneficiaries with a diagnosis of congestive heart failure. The program launched on April 1, 2018, and planned to engage 1,413 beneficiaries in eight counties in California. This report considers the impacts of the MTM pilot program on outcomes of 783 beneficiaries who had enrolled through April 9, 2021, and it considers the experiences of beneficiaries enrolled through April 2022.

To be eligible for the MTM program, Medi-Cal beneficiaries with congestive heart failure must have recently had a inpatient hospital stay, an emergency department visit, or a skilled nursing facility stay. Additionally, beneficiaries must have been continuously covered by Medi-Cal for 12 months or more, had a primary or specialty care visit in the year prior to engagement, and received a clinician referral to the program.

Beneficiaries who enrolled in the program received the following services:

1. **Medically tailored meals.** Enrolled beneficiaries received three meals per day delivered to their homes for 12 weeks. The meals were medically tailored to the needs of congestive heart failure patients. Meal delivery personnel also conducted wellness checks while delivering.

2. **Medical nutrition therapy.** Program participants received four sessions of medical nutrition therapy delivered by a registered dietitian in person or over the phone to discuss individual dietary and nutritional needs.

3. **Case management and community referral.** Beneficiaries were engaged in program case management and referred to community-based resources as needed.

The MTM pilot program was intended to improve health outcomes and reduce health care expenditures for beneficiaries with congestive heart failure. By ensuring beneficiaries with congestive heart failure who recently experienced an acute health event received medically appropriate food, the program could have a direct effect on participants' diet-sensitive health condition. Additionally, providing meals can reduce food and income insecurity and decrease the burden associated with planning and preparing meals. This frees up resources that could be used for medications or other expenses. These additional resources could, in turn, enable participants to devote more time and energy to recovering from an acute event and to healthy behaviors such as medication adherence. Finally, the meals constitute a concrete illustration of healthful eating that, along with the nutritional therapy, can help educate beneficiaries about nutritional management of congestive heart failure and set them up for long-term dietary change. **Figure II.1** includes a logic model that describes the short-term, intermediate, and long-term impacts of the program.

Figure II.1. Logic model for MTM pilot program
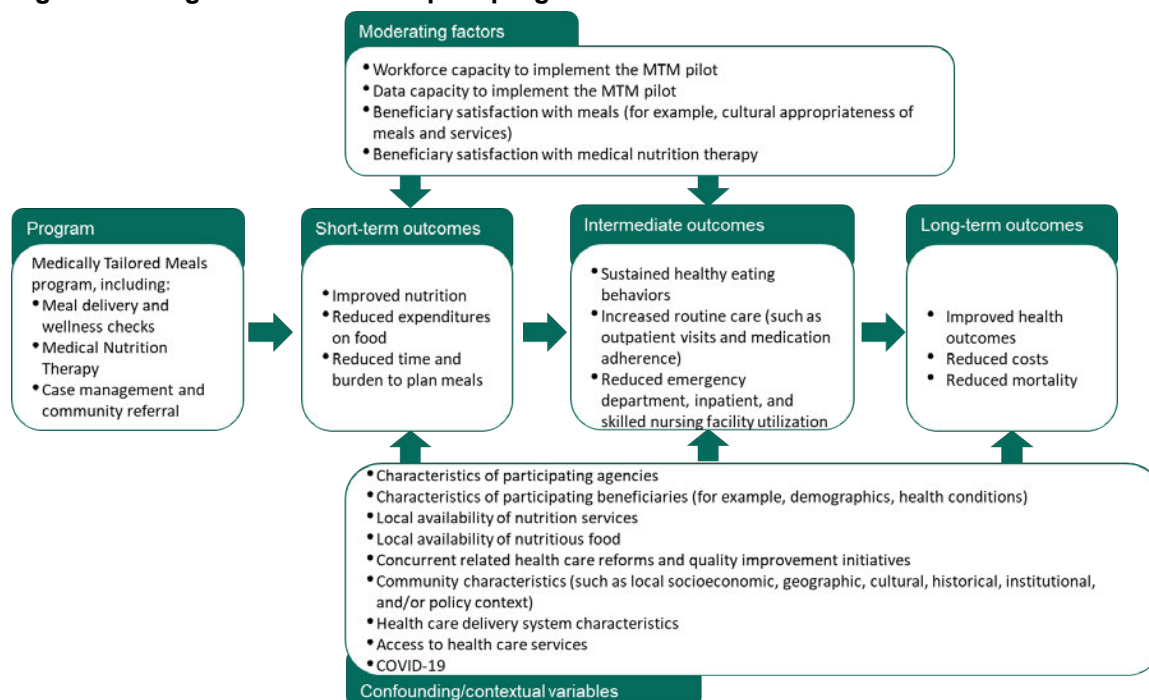
Notes: MTM = medically tailored meals.

B. Agencies participating in the MTM pilot program

The program funded six community-based agencies which are part of the California Food is Medicine Coalition to administer the program in eight counties in California. Project Open Hand administered the program in San Francisco and Alameda Counties, ensured program compliance and fiscal integrity, and subcontracted with five other agencies, including the Ceres Community Project, Food for Thought, Health Trust, Mama's Kitchen, and Project Angel Food to implement the program in other counties. All six agencies had substantial experience delivering meals to people with serious health conditions, although they varied somewhat in their target populations and in how they prepared and delivered meals (See **Table II.1**). Most agencies produced their own meals for pilot program participants, and those that did not relied on Project Open Hand's kitchen in San Francisco. Similarly, most agencies delivered a combination of fresh and frozen food to program participants, but two agencies delivered only fresh food.

Table II.1. Agencies participating in MTM pilot program

Agency name	Counties served under MTM pilot	Founding year	Number of staff	Meals served per year	Populations served	Meal type	Food production	Pilot delivery frequency
Ceres Community Project	Marin, Sonoma	2007	38	110,000 meals to 700 participants (2020)	People of all ages with serious illness[a]	Fresh	On-site kitchens	Twice a week
Food for Thought	Sonoma	1988	17	~273,000 meals to 672 participants (2019)	People of all ages with serious illness[a]	Fresh and frozen	Obtain meals from Project Open Hand—San Francisco	Once a week
The Health Trust	San Mateo, Santa Clara	1996	Unknown	~89,000 meals to 636 participants (2019)	Seniors and adults with disabilities or complex health conditions	Fresh	Receive meals from vendor	Five days a week
Mama's Kitchen	San Diego	1990	29	~368,500 meals to 1,624 participants (2019)	People of all ages with serious illness	Fresh	On-site kitchens	Twice a week
Project Angel Food	Los Angeles	1989	73	1,080,000 meals to 2,300 participants (2020)	People of all ages with serious illness	Fresh and frozen	On-site kitchens	Twice a week
Project Open Hand—Alameda	Alameda	1989	Unknown	~934,000 meals (Alameda and San Francisco combined) (FY2019)	People of all ages with serious illness	Fresh and frozen	Obtain meals from Project Open Hand—San Francisco	Twice a week
Project Open Hand—San Francisco	San Francisco	1985	Unknown	(see above)	People of all ages with serious illness	Fresh and frozen	On-site kitchens	Twice a week

Source: Agency websites and Mathematica interviews with agency staff, conducted July – November 2020.

[a] During the COVID-19 pandemic, DHCS expanded meal delivery program to include those in a geographic region with food insecurity.

C. Pilot counties

The counties served by agencies that implemented the MTM pilot program varied substantially in terms of demographic and geographic characteristics (See **Table II.2**). Although population density varies, all pilot counties have more people per square mile than the average in California, and substantially more than the average within the United States. The age and sex distributions are generally similar across counties and are representative of California and the United States, with some exceptions – San Francisco County and Sonoma County have a lower proportion of individuals under age 18, and Marin County and Sonoma County have a higher proportion of individuals over age 65 than the state and country as a whole. Race and ethnicity vary across counties, with many differing substantially from the rest of the state and country as a whole. For example, Alameda, San Francisco, San Mateo, and Santa Clara counties have greater than 30 percent Asian populations, as compared with California at 16 percent and the United States at 6 percent. People of Hispanic ethnicity account for 16 percent in Marin County but 49 percent in Los Angeles County, compared with 39 percent and 19 percent in California and the United States, respectively. Several pilot counties have large proportions of their populations who were born abroad and/or who speak a language other than English at home. The percentage of the adult population who are enrolled in Medicaid varies substantially, from 8 percent in Marin County to 21 percent in Los Angeles County, compared with 18 percent in California and 12 percent in the United States. The pilot program counties, with the exception of Los Angeles County, also have higher levels of high school and college completion, lower uninsured rates, and all of the pilot program counties have higher income than the state or national average.

Table II.2. MTM participating counties, demographic, and geographic characteristics, 2021

	Alameda County	Los Angeles County	Marin County	San Diego County	San Francisco County	San Mateo County	Santa Clara County	Sonoma County	California	United States
Population and geography										
Population per square mile, 2020	2,281	2,466	504	784	18,629	1,704	1,500	310	254	93.8
Age and sex										
Under 18 years (%)	20	21	20	21	13	20	22	19	23	22
65 years and over (%)	14	14	23	15	16	17	14	21	15	17
Sex										
Female (%)	51	51	51	50	49	51	49	51	50	51
Race										
White alone (%)	49	71	85	75	53	60	52	87	72	76
Black or African American alone (%)	11	9	3	6	6	3	3	2	7	13
American Indian and Alaska Native alone (%)	1	1	1	1	1	1	1	2	2	1
Asian alone (%)	32	15	7	13	36	31	39	5	16	6
Native Hawaiian and Other Pacific Islander alone (%)	1	0	0	1	1	2	1	0	1	0
Two or more races (%)	5	3	4	5	5	5	4	4	4	3
Ethnicity										
Hispanic or Latino (%)	22	49	16	34	15	24	25	27	39	19
Immigration and language										
Foreign born (%)	33	34	18	23	34	35	40	17	27	14
Language other than English spoken at home (%)	46	56	21	37	43	46	53	26	44	22

	Alameda County	Los Angeles County	Marin County	San Diego County	San Francisco County	San Mateo County	Santa Clara County	Sonoma County	California	United States
Education										
High school graduate or higher (%)	89	80	94	88	89	90	89	89	84	89
Bachelor's degree or higher (%)	49	34	60	40	59	52	54	36	35	33
Disability status										
With a disability (%)	6	6	5	6	6	4	5	8	7	9
Health insurance status										
Adults with Medicaid only or with Medicare and Medicaid[a] (%), 2019	14	21	8	14	15	10	12	12	18	12
Uninsured (%)	5	11	5	9	5	6	6	8	9	10
Income and poverty										
Median household income ($)	104,888	71,358	121,671	82,426	119,136	128,091	130,890	86,173	78,672	64,994
In poverty (%)	9	13	6	10	10	6	7	8	12	11

Source: U.S. Census Bureau QuickFacts, 2021 unless otherwise noted. https://www.census.gov/quickfacts/fact/table/US/PST04521.

[a] Calculated from 2019 American Community Survey (ACS) 1-year estimates (U.S. Census Bureau 2019).

D. Review of literature

Previous research on MTM programs demonstrated positive changes to nutrition and eating behaviors, reduced use of high-cost health care services, improved physical and mental health outcomes, and reduced health care costs. In the study most relevant to the Medi-Cal pilot program's target population, the authors randomly assigned 66 people discharged from heart failure hospitalizations to receive MTM or usual care, finding favorable effects on 30-day readmission rates with those receiving MTM (Hummel et al., 2018). Other research on medically tailored meals in Massachusetts found sizeable decreases in high-cost utilization (Berkowitz et al. 2018, 2019b). Berkowitz et al. (2018) estimated reductions of 70 percent for emergency department use, 52 percent for inpatient stays, and 72 percent for emergency transportation among people dually eligible for Medicare and Medicaid with physician-identified nutritional risk, despite a small sample size (133 in the treatment group). A larger study (499 in the treatment group), found reductions of 49 percent for inpatient stays, 72 percent for skilled nursing facility admissions, and 16 percent for health care costs for patients that received MTM relative to a matched comparison group (Berkowitz et al. 2019a). Recently, Kaiser Permanente conducted a randomized clinical trial (497 randomized to receive MTMs and nutritional counseling, 496 randomized to receive MTMs only with no nutritional counselling, and 984 receiving usual care) to assess the impact of MTM on hospitalizations, mortality, and emergency department visits in a population of adults with prior history of heart failure, diabetes mellitus, and/or chronic kidney disease at high readmission risk (Kaiser Permanente, 2021). The study found that MTMs did not significantly reduce risk of all-cause hospitalization, emergency department visits, or diabetes-related hospitalizations. Exploratory analyses showed that MTMs were associated with lower mortality rates and fewer hospitalizations for heart failure. Participants receiving virtual nutritional counseling and MTMs did not have better outcomes compared to participants receiving MTMs alone (Go et al., 2022).

Prior research also sheds light on some of the mechanisms through which MTMs can affect outcomes. One qualitative study of MTM participants with diabetes found that MTMs improved their quality of life, ability to manage diabetes, and stress reduction. (Berkowitz et al., 2020).

Although the studies above demonstrate favorable outcomes across multiple settings, most were conducted on a considerably smaller scale than the Medi-Cal MTM pilot program. Except for Go et al. (2022), a moderately sized randomized controlled trial, other studies were relatively small. Many were limited to participants in one or a few metropolitan areas. In addition, although many of the studies account for selection into MTM programs via a matched comparison group approach, some fail to adequately control for patterns of use immediately before enrollment, which could introduce bias in estimating program impacts.[5] For example, if individuals in the treatment group have higher than usual health care use just before enrolling in a MTM program, but comparison individuals do not, this could introduce more regression to the mean in the treatment group than the comparison group, which would bias impact estimates in favor of finding positive program effects. This evaluation, with a substantially larger sample size, broader

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[5] Biased estimates could occur, for example, if beneficiaries are more likely to enroll in MTM after an acute (or "trigger") event. If the beneficiaries were unlikely to experience another acute event shortly after the trigger event, their health care use might be reduced naturally, but might appear to fall because of MTM. This would be an incorrect conclusion because it would have declined even without the MTM intervention.

geographic study area, and rigorous matched comparison group approach, will thus contribute important evidence on the implementation and impact of MTM programs for Medicaid beneficiaries.

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III. Objectives

> **Key takeaways**
> - The final report assessed the pilot program's impacts for 783 beneficiaries who enrolled by April 9, 2021.
> - Mathematica used qualitative methods to explore participant experience, systematically describe program implementation, and identify promising practices for beneficiaries enrolled through April 2022.

A. The evaluation

The goal of this evaluation is to determine the causal impacts of the MTM pilot program on health care use and health outcomes for beneficiaries with congestive heart failure. This final evaluation report presents the findings from Mathematica's evaluation of the MTM Pilot Program conducted on behalf of the DHCS. Mathematica conducted a mixed methods evaluation, collecting and analyzing both primary and secondary data to characterize implementation and assess impacts on key health care use outcomes and describe implications for similar programs.

This report considers the impacts of the MTM pilot program on outcomes of 783 beneficiaries who had enrolled in the pilot program from April 1, 2018 through April 9, 2021, and it considers the experiences of beneficiaries enrolled through April.[6] Evaluators also use qualitative methods to explore participant experience, systematically describe program implementation, and identify promising practices. **Table III.1** lists the evaluation questions, hypotheses, data sources, and methods for the final report.

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[6] Beneficiaries who enrolled in the MTM pilot program on April 10, 2021, or later did not have sufficient claims runout (6 months) to be observable in the follow-up period for a minimum of 3 months, and therefore they were not included in the impact evaluation in the final evaluation report.

Table III.1. Evaluation questions, data sources, and methods in the MTM pilot program final evaluation report

Impact Analysis		
Topic 1: Health care utilization		
Hypothesis: The MTM pilot program will reduce utilization of acute and post-acute health care services and increase use of preventive health care services.		
Topics and evaluation questions	**Data sources**	**Analytic method**

1 What is the impact of the MTM pilot program on primary (●) and secondary (○) health utilization outcomes?
• Emergency department visits
• Inpatient stays
• SNF admissions
  ○ CHF medication adherence
  ○ Outpatient office visits
	Medi-Cal enrollment, claims/encounter, and provider data	Negative binomial, logistic, and ordinary least squares regression with difference-in-differences model

2 Does MTM's impact differ by subgroups? - Beneficiaries who complete the program vs. those who did not - Dually eligible vs. non-dually eligible beneficiaries - White non-Hispanic vs. non-white and/or non-Hispanic beneficiaries - Beneficiaries with baseline CDPS risk scores[a] above the median vs. those below the median - Beneficiaries with comorbidities targeted by the state's expanded MTM program, - Beneficiaries living in each of the 8 pilot program counties	Medi-Cal enrollment, claims/encounter, and provider data	Sample stratification with negative binomial, logistic, and ordinary least squares regression with difference-in-differences model
Topic 2: Health outcomes		
Hypothesis: The MTM pilot program will improve health outcomes.		
Topics and evaluation questions	**Data sources**	**Analytic method**
3 What is the impact of the MTM pilot program on health outcomes? Mortality (over three-, six-, and twelve-month time horizon)	Medi-Cal enrollment and claims/encounter data	Logistic regression

Implementation Evaluation			
Topic 3: Participant experience			
	Topics and evaluation questions	**Data sources**	**Analytic method**
4	How do participants perceive the program?	Participant focus groups and interviews	Thematic analysis
5	How satisfied are participants with the MTM pilot program?	Participant focus groups and interviews	Thematic analysis
6	What are the main barriers to participation?	Participant focus groups and interviews Key informant interviews	Thematic analysis
7	What suggested improvements would enhance participants' experience of and satisfaction with the program?	Participant focus groups and interviews	Thematic analysis
Topic 4: Pilot program processes and infrastructure			
	Topics and evaluation questions	**Data sources**	**Analytic method**
8	How do implementing agencies approach each MTM pilot program component (for example, recruitment, enrollment, meal delivery, and nutrition therapy)?	Key informant interviews	Thematic analysis
9	What changes have implementing agencies made to the pilot program and why?	Key informant interviews	Thematic analysis
Topic 5: Promising practices			
	Topics and evaluation questions	**Data sources**	**Analytic method**
10	What key strategies have facilitated pilot program implementation?	Key informant interviews	Thematic analysis
11	What are promising practices?	Key informant interviews	Thematic analysis

CDPS = Chronic Illness and Disability Payment System; CHF = congestive heart failure; MTM = medically tailored meals; SNF = skilled nursing facility

[a] The Chronic Illness and Disability Payment System is a risk adjustment system calibrated to the Medicaid population.

B.   Final report structure

Below describes the focus areas and organization of the report:

- Chapter IV describes the **problem statement.**

- Chapter V explains the **qualitative and quantitative methods** used in the evaluation.

- Chapter VI describes **the findings from the implementation evaluation** findings which synthesize information from key informant interviews and site visits with agency staff, and from a combination of focus groups and interviews with participants. Evaluators aim to understand participant experience, intervention processes and infrastructure, promising practices, and recommendations for improvement.

- Chapter VII **describes findings from an impact analysis** using Medi-Cal claims and managed care encounter data to assess the MTM pilot program's impact on health care use and health outcomes. Evaluators also include subgroup-specific impacts for the main outcomes.

- Chapter VIII summarizes **conclusions from the evaluation**, highlighting key takeaways.

- Chapter IX **provides recommendations for improvements** to Medi-Cal programs that provide MTM.

- Chapter X. describes the **implementation plan/ strategy.**

- Chapter XI. describes the MTM pilot programs impact.

Additional information and detailed methods are included in the appendices. Appendix A contains key informant interview protocols; Appendix B contains protocols for beneficiary focus groups and interviews. Appendix C contains additional detail on the impact evaluation methodology, and Appendix D contains full regression results for the main analysis and subgroups, as well as the results of robustness checks for the quantitative analyses.

IV.   Problem Statement

The Food is Medicine Coalition lobbied in California to implement the MTM Pilot Program. Proper nutrition can significantly improve health outcomes for the chronically ill, as demonstrated through similar efforts in other states. California was the first state to implement a large-scale MTM pilot program, with the hope of improving the health of our frailest populations, reducing food insecurity, and providing significant cost savings as participants of the program are expected to reduce skilled nursing, hospital, and emergency department utilization.

The Food is Medicine Coalition consulted with medical experts at DHCS to determine a viable pilot program that would target a specific chronic condition that would, if effective, demonstrate clear positive health outcomes. DHCS and the Food is Medicine Coalition decided to focus the program on adults with congestive heart failure due to its substantial burden on the US healthcare system.

The MTM Pilot Program, authorized by Welfare and Institutions Code § 14042, requires DHCS to develop and submit an evaluation report to the Legislature upon completion of the program. The report is intended to inform the Legislature and the public of any positive health outcomes, best practices, and reductions in institutionalizations for MTM participants.

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V. Study Methodology

Key takeaways

- The implementation evaluation conducted key informant interviews and site visits with implementing agencies, and focus groups and interviews with MTM participants.

- The impact evaluation identified a matched comparison group and used a difference-in-differences regression analysis to estimate the impact of the MTM pilot program on emergency department visits, inpatient stays, skilled nursing facility admissions, congestive heart failure medication adherence, and outpatient physician office visits.

A. Implementation evaluation methods

Mathematica collected and analyzed primary data from three sources: (1) key informant interviews with staff and leadership of implementing agencies; (2) focus groups and individual interviews with pilot program participants; and (3) virtual site visits with selected participating agencies involving interviews with multiple staff and leadership personnel. The key informant interviews and virtual site visits were designed to capture the experience of implementation from the agencies' perspectives and to gain insight into challenges and facilitators. Through the participant interviews and focus groups, evaluators gathered participants' perspectives regarding the program, barriers to participation, and suggestions for improvement.

1. Key informant interviews with implementing agencies

Mathematica conducted interviews with 13 program administrators and staff across the six implementing agencies, including program directors at each agency, dietitians from three agencies, and meal delivery personnel from two agencies. Two-person teams conducted the interviews from July to November 2020, with each interview lasting approximately one hour, with all of the interviews recorded and transcribed.

a. Interview topics

Mathematica developed semi-structured interview protocols containing questions regarding the agencies' experiences with creating the processes and infrastructure for the pilot program, the challenges they faced in doing so, and the changes they made to the intervention along the way. Protocols also included questions about factors that facilitated the successful implementation of the pilot program and the agencies' perceptions of implementation best practices. Interviews took place during Summer and Fall 2020 to capture perspectives on an agency's pre-launch and early pilot program implementation experiences. The full interview protocols are included in **Appendix A**.

b. Interview analysis

Mathematica used a Microsoft Excel tool to analyze responses, identify themes, and compare information across respondents and the six agencies. Evaluators used the tool to identify common themes and to understand how implementation processes and experiences differed

across the six agencies. This report includes examples from agency and client interviews to illustrate themes and provide concrete information regarding challenges, successes, and strategies. Unless specified, examples are not meant to indicate that other agencies provided different services or experienced the program differently.

2. Focus groups and interviews with MTM participants

Mathematica conducted two rounds of data collection from program participants. Round 1 interviews covered participant experiences during the first half of the pilot program corresponding to interviewee enrollment dates between January 2019 and June 2020. Interviews for Round 2 covered participant experiences in the final year of the pilot program for beneficiaries who enrolled in the MTM Pilot program between April through November 2021.

For both rounds of participant data collection, Mathematica received an institutional review board approval from the California Committee for the Protection of Human Subjects, and the researchers protected the privacy, confidentiality, and anonymity of respondents. This included de-identifying the focus group and interview transcripts before analysis.

a. Recruitment

For the first round of participant interviews in 2020, Mathematica recruited a total of 20 English-speaking participants for two focus groups and 15 one-on-one interviews. In the second round in 2022, they recruited a total of 16 participants (eight English-speaking and eight Spanish-speaking) for one-on-one interviews.

To recruit participants, the evaluators sent email requests to the implementing agencies, asking each to compile a list of male and female participants   that roughly represented the racial and ethnic composition of their overall MTM participant population. Evaluators also asked for participants meeting the characteristics specified in **Table V.1** below.

The evaluators asked for participant contact information, as well as information regarding recent hospitalizations to identify participants with high health care utilization. Mathematica also sent flyers to each agency to distribute to participants to help inform them learn about the evaluation and encourage their participation.

All six agencies provided participant lists with information on a total of 237 participants for Round 1 and 132 participants for Round 2 (see **Figure V.1**).

Mathematica called participants up to two times to explain the purpose of the focus groups and interviews and to ask for their participation in the evaluation. During the recruitment calls, participants received information about their rights as research participants, including that their participation was voluntary and would not affect their Medi-Cal coverage or access to health care and offered them a $35 VISA gift card to participate. For patients who agreed to participate, information was sent about the purpose of the interviews and provided informed consent paperwork via U.S. mail in advance. Gift cards were sent to each respondent upon completion of the focus group or interview. For round 2, all protocols, recruitment materials, and informed consent paperwork were translated into Spanish.

Table V.1. Participant interview criteria

Quantifier	Round 1	Round 2
Data collection dates	September-October 2020	March-April 2022
Interview targets	20 English-speaking participants enrolled in the program between January 2019 and June 2020 for: • Two focus groups • 15 one-on-one interviews.	8 English-speaking participants and 8 Spanish-speaking participants, enrolled between May and December 2021, for a total of 16 one-on-one interviews.
Participant sample request	40 English-speaking participants per agency, including: 10 participants who completed the program before March 2020 (prior to California's declaration of the COVID-19 public health emergency) 10 participants who had not completed the program before March 2020 10 participants known to the program to be frequent emergency department or hospital users[7] 10 participants who enrolled, but did not complete the program for reasons unrelated to eligibility (for example, they dropped out of the program because they did not like the food, rather than moving away or losing Medi-Cal coverage)	20 English- and 20 Spanish-speaking participants per agency, including: • 20 participants who enrolled and completed the program after May 2021 or who were currently enrolled • 10 participants known to the program to be frequent emergency room or hospital users who enrolled and completed the program after May 2021 • 10 participants who enrolled in the program after May 2021, but did not complete the program for reasons not related to eligibility (for example, they dropped out of the program because they did not like the food, rather than moving away or losing Medi-Cal coverage)

[7] The evaluators defined frequent users as clients having (a) four or more visits to the emergency department or (b) two or more inpatient stays in the past year.

Figure V.1. Participant recruitment for Round 1 and Round 2 focus groups and interviews

Participant recruitment for Round 1 focus groups and interviews

N = 237 Participant names provided by agencies

N = 82 Participants attempted to reach by phone (up to two attempts)

N = 36 Participants who did not answer or respond to voicemails

N = 13 Participants who declined to participate

N = 33 Participants who accepted invitation to participate

N = 13 Participants who did not show up for scheduled interview or focus group

N = 20 Participants who completed focus groups or interviews

Participant recruitment for Round 2 interviews

N = 132 Participant names provided by agencies

N = 53 Participants attempted to reach by phone (up to two attempts)

N = 30 Participants who did not answer or respond to voicemails

N = 7 Participants who declined to participate

N = 16 Participants who completed interviews
N = 8 English-speaking
N = 8 Spanish-speaking
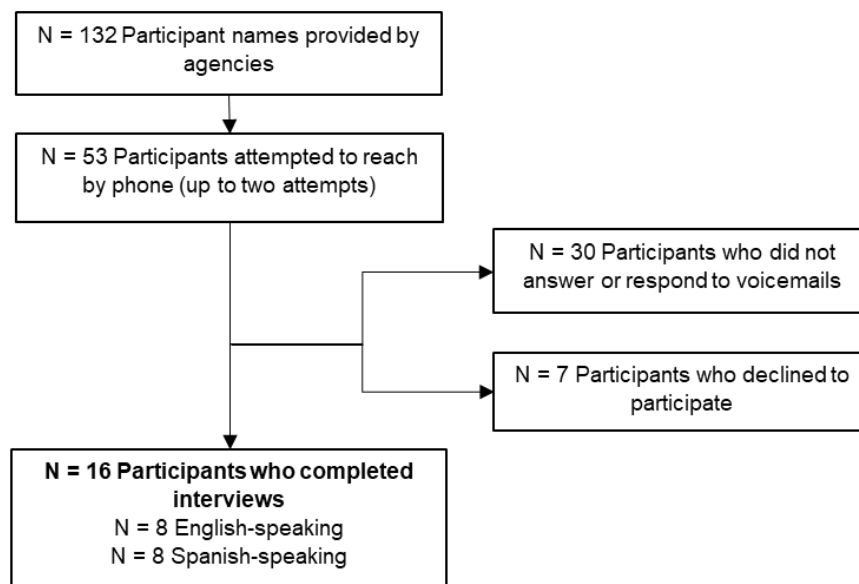
b.   Focus groups and interview protocols

Mathematica developed semi-structured focus groups, as well as interview protocols with questions regarding the participants' satisfaction with the program, barriers to participation, and suggested improvements for the program. Spanish versions of the protocols were created for Round 2 interviews. The full protocols are included in **Appendix B**.

c.   Interviews

Mathematica conducted two focus groups, and the subsequent interviews on a rolling basis. Each interview lasted up to one hour and were recorded and transcribed.

d.   Analysis

Mathematica used a Microsoft Excel tool to analyze responses, identify themes, and compare participant responses. The evaluators analyzed subthemes across respondents and tallied the number of participants reporting each subtheme, as shown in **Table V.2**. For some subthemes discussed below, findings were reported on less than the full sample of 36 participants, as not all questions were asked of every participant, including those who dropped out of the program before completing it and those who were extremely weak or ill during the interview. Other participants struggled to understand some of the questions due to hearing difficulties or language barriers and were not able to answer all questions.

Table V.2. Quantifiers for analysis

Quantifier	With full sample (36 participants)	With less than full sample (that is, fewer than 36 answered)
Couple	2	2 (about 7%)
Few	3–8	8–24%
Quarter	9	25%
Several or some	10–14	26–40%
Approximately half	15–21 (or half, if exactly 18)	41–59%
Many	22–27	60–75%
Most	28–35	76–99%
All	36	100%

3.   Site visits

In late 2022, Mathematica identified three agencies that represented diverse geographic regions of the state to undergo site visits: Project Open Hand Alameda, Project Angel Food, and Mama's Kitchen. The researchers sent invitations to the agencies requesting to speak to the Chief Executive Officer (CEO) or other leader of the organization, a program administrator, a dietitian, and one employee each from personnel, meal delivery and client services.

a.   Site visit interview topics

Interviewers used the same semi-structured interview protocols used in the key informant interviews. These protocols asked about the agencies' experiences creating processes and

infrastructure for the pilot program, the challenges they faced in doing so, and the changes they made to the intervention along the way. Protocols also included questions about factors that facilitated the successful implementation of the pilot program and the agencies' perceptions of implementing best practices. The full interview protocols are included in **Appendix A**.

b. Site visit interview analysis

Mathematica used a Microsoft Excel tool to analyze responses, identify themes, and compare across respondents. Evaluators used the tool to identify common themes, and to understand how implementation processes and experiences differed between the six agencies. The evaluators selected examples from site visit interviews to illustrate themes and provide examples of challenges, successes, and strategies. Unless specified, examples are not meant to indicate that other agencies provided different services or experienced the program differently.

B. Impact evaluation methods

Mathematica analyzed administrative data from DHCS including: Medi-Cal eligibility records, claims, and managed care encounters to identify beneficiary characteristics and outcomes of interest. The evaluators assessed selection into the pilot program by comparing treatment beneficiaries with eligible but not enrolled beneficiaries and created a matched comparison group. After ensuring the treatment and comparison group had good balance on important characteristics, the evaluators conducted regression analysis using a difference-in-differences framework to isolate the impact of the MTM pilot program on key outcomes, controlling for baseline utilization, trends over time, and beneficiary characteristics. This included beneficiaries who started receiving meals by April 9, 2021, and considered eligibility, claims, and encounter data (extracted January 2022) with eligibility months or service dates through July 9, 2021. For more details on the impact evaluation methods, see **Appendix C.**

1. Evaluation inclusion criteria

The analysis included beneficiaries who started receiving meals by April 9, 2021. This cut-off ensured all included beneficiaries could be observed for at least three months of follow-up after meal start (or pseudo start, in the case of comparison beneficiaries) with adequate claims run-out (six months) to capture all health care utilization in the follow-up period. Among the 965 beneficiaries who started receiving meals during this time, the evaluation incuded783, with 182 beneficiaries excluded from the study because their pilot program eligibility criteria could not be verified using administrative data (e.g., congestive heart failure diagnosis, hospital utilization, etc.). The evaluators made this choice to ensure that the enrolled beneficiaries and comparisons were similar. There are several reasons why beneficiaries may not have met eligibility criteria from the administrative data, including: incomplete claims information for dually eligible beneficiaries, discordance between the definitions for eligibility and eligibility standards applied in practice, and ineligible enrollment in the MTM pilot program. Appendix C describes the enrollment-based and claims-based eligibility criteria in more detail. **Figure V.2** shows the number of MTM enrolled beneficiaries who were excluded from the analysis sample.

Figure V.2. Treatment group inclusion criteria
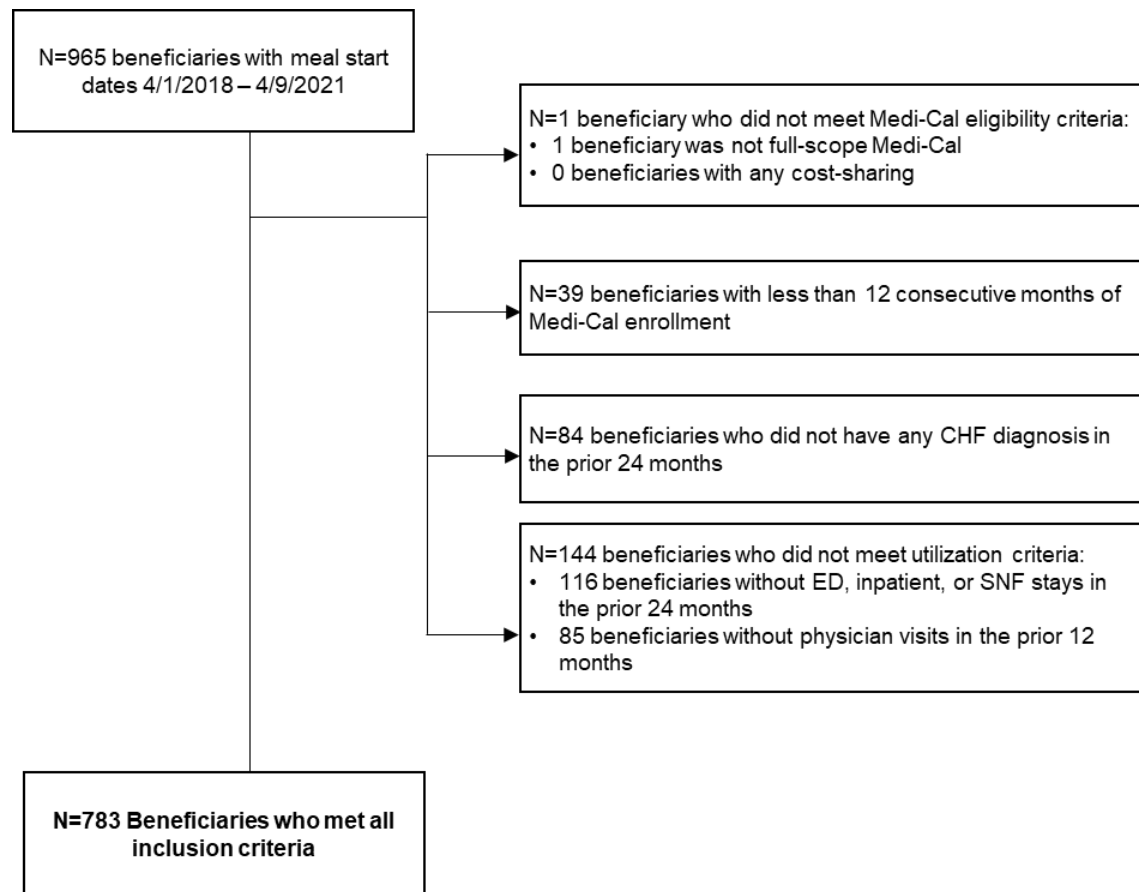
Note: Beneficiaries may be ineligible for multiple reasons. Beneficiaries with no Medi-Cal claims in the baseline period would not record a congestive heart failure diagnosis or any utilization.

2.   Data and variable construction

Mathematica captured beneficiary demographic and enrollment characteristics using Medi-Cal monthly enrollment records and used it to create variables for matching and regression controls. Variables capturing beneficiary diagnoses, utilization, and expenditures came from Medi-Cal claims and managed care encounter data. ZIP code characteristics came from the U.S. Census Bureau American Community Survey. For more details on the data sources and variables constructed, see **Appendix C**.

All variables were constructed quarterly for each beneficiary. Quarter 1 begins on the date when a treatment beneficiary received their first meal and indicates the first quarter of the follow-up period. Quarters -3, -2, -1, and 0 make up the baseline year, and quarters 1, 2, 3, and 4 comprise the follow-up period. All quarters are 91 days long and are defined with respect to the meal start date (or meal pseudo start date, see subsection 3 below) to account for rolling

admission to the program. For this report, only data through July 9, 2021 was included to allow adequate time for claims adjudication and processing.[8]

The primary outcome measures capture utilization of emergency department, inpatient, skilled nursing facility, and outpatient physician office services, as well as congestive heart failure medication adherence and prescription fills. To capture changes in overall utilization, the analysis considers the number of services (or prescriptions) received in each quarter for the service measures and the proportion of days in the quarter covered by congestive heart failure medication. The evaluators also developed supplemental measures to provide a fuller picture of how utilization responded to the MTM pilot program (See **Table V.3**).

Table V.3. Quarterly main and supplemental outcome measures

Main outcomes	Supplemental outcomes
High-cost acute and post-acute care	
ED visits (count)	ED visits for CHF (count)
	Ambulance transports (count)
Inpatient stays (count)	Inpatient days
	Inpatient stays for CHF (count)
	Inpatient days for CHF (count)
	Inpatient stays with ICU or coronary care (count)
SNF stays (count) [a]	SNF days
	SNF days
Preventive services	
CHF medication adherence (proportion of days covered)	Prescription fills (count)
	Beta blocker adherence (proportion of days covered)
	ACE inhibitor or angiotensin receptor blocker adherence (proportion of days covered)
Outpatient office visits (count)	Primary care visits (number)
	Specialist visits (number)
Health outcomes	
Mortality (binary)	N/A

[a] SNF stays for CHF occurred too infrequently to be included as an outcome measure.

ACE = angiotensin converting enzyme; CHF = congestive heart failure; ED = emergency department; ICU = intensive care unit; SNF = skilled nursing facility; N/A = not applicable.

In addition to the quarterly outcome measures, Mathematica created semi-annual measures to capture all utilization in the baseline year and follow-up years for each included beneficiary. The evaluators also created binary versions of each outcome measure to capture whether the beneficiary utilized the service or medication in the quarter or year. The quarterly measures are the main outcomes and trace the impacts of the MTM pilot program over time. The more

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[8] The analysis period includes the time period when COVID-19 was prevalent in California. The evaluators accounted for COVID-19 in matching and regression controls in this report. See Appendix D for details.

aggregated measures (semi-annual and annual) improve precision when looking at impacts over longer time horizons.

The control variables capture a variety of beneficiary demographic, enrollment, health characteristics, and select characteristics of their zip code of residence (See **Table C.4** in **Appendix C**).

3. Comparison group selection

Mathematica identified a comparison group using Medi-Cal enrollment and claims data that represents the best estimate alternative outcomes had beneficiaries not received MTM through the pilot program. The evaluators first identified beneficiaries who met all enrollment-based and claims-based eligibility criteria at some point in the study period (see **Appendix C** for more detail). Because beneficiary eligibility changes over time (for example, as more than a year passes since the most recent qualifying acute care utilization), the evaluators created monthly copies of potential comparison group beneficiaries and assessed their eligibility each month from April 2018 through April 2020. The evaluators thus considered all possible pseudo start months for comparison beneficiaries when creating the matched comparison groups. However, the evaluators allowed only one copy of each potential comparison beneficiary matched.

Since only a small percentage of eligible beneficiaries enrolled in the MTM pilot program,[9] Mathematica chose to construct the comparison group using only beneficiaries within the pilot program counties. The within-county comparison group has the advantage that all comparison beneficiaries are enrolled in similar Medi-Cal managed care plans, receive care from similar health care facilities, live in similar environments, and experienced similar changes over time; such as during the COVID-19 pandemic. Choosing a within-county comparison group runs the risk that those who chose to participate in the MTM pilot program were different from those who were eligible but chose not to enroll. However, low enrollment numbers reduce the risk of this selection bias, supporting the within-county approach.

4. Matching

Mathematica then used propensity score matching to select a comparison group of 3,506 beneficiaries from the list of eligible, but not enrolled beneficiaries, that was similar to the treatment group on demographic characteristics, diagnoses, ZIP code level characteristics, and baseline utilization. The evaluators required that treatment and matched comparison beneficiaries lived in the same county. Up to 5 comparison beneficiaries were matched to each treatment beneficiary, without replacement, using a matching algorithm called GroupMatch. See **Appendix C** for more details on the matching algorithm.

Then, Mathematica matched 3,585 comparison beneficiaries to the 783 treatment beneficiaries. After matching, the treatment and comparison groups were closely balanced on key demographic characteristics, diagnoses, and baseline utilization (See **Table V.4**).[10] **Table C.2** lists the covariates included in the matching model.

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[9] As of 4/9/2021, about 0.6 percent of all beneficiaries who appeared eligible for MTM were enrolled.
[10] Standardized differences of 0.10 or less are considered excellent balance. Standardized differences of 0.25 or less are considered acceptable for analytic purposes.

Table V.4. Treatment and comparison group balance table

Variable	Treatment mean (N = 783)	Comparison mean (N = 3,506)	Absolute Standardized Difference
Demographics			
Age (years)	59	60	-0.12
Male	56%	56%	-0.01
White, non-Hispanic	25%	27%	--
Black, non-Hispanic	23%	19%	0.09
Latinx	29%	26%	0.08
Asian / Pacific Islander	5%	7%	-0.10
Other race	17%	21%	-0.09
Medi-Cal enrollment			
Dually eligible	31%	31%	0.00
Number of consecutive months enrolled before start date	39	38	0.09
Diagnoses			
CDPS score	6.4	6.3	0.04
Acute or acute-on-chronic congestive heart failure	71%	71%	0.01
Chronic and unspecified congestive heart failure	78%	76%	0.07
Right heart failure	6%	6%	0.01
End-stage renal disease	2%	4%	-0.07
Behavioral health diagnosis	74%	70%	0.10
Baseline health care utilization			
Emergency department visits, 1 quarter before start date	1.4	1.3	0.04
Emergency department visits, 2 to 4 quarters before start date	2.6	2.3	0.08
Inpatient stays, 1 quarter before start date	0.9	0.9	0.01
Inpatient stays, 2 to 4 quarters before start date	1.3	1.1	0.09
Skilled nursing facility stays, 1 quarter before start date	0.01	0.02	-0.06
Skilled nursing facility stays, 2 to 4 quarters before start date	0.05	0.05	0.02
Proportion of days covered by congestive heart failure medications, 1 quarter before start date	58%	55%	0.06
Proportion of days covered by congestive heart failure medications, 2 to 4 quarters before start date	50%	46%	0.10
Outpatient visits, 1 quarter before start date	4.3	4.2	0.04
Outpatient visits, 2 to 4 quarters before start date	10.1	9.2	0.09
ZIP code characteristics			
Rural ZIP code	0.1%	0.2%	-0.02

Variable	Treatment mean (N = 783)	Comparison mean (N = 3,506)	Absolute Standardized Difference
ZIP code fraction living in a food desert	5%	6%	-0.02
ZIP code fraction in poverty	16%	14%	0.16

Mathematica required a close match on both the average utilization in the baseline period and on baseline trends in utilization. Matching on baseline trends was important because evaluators observed a spike in acute and post-acute care use among treatment beneficiaries in the quarter prior to enrolling in the pilot program. Evaluators worked to ensure that matching produced parallel trends in the baseline period to ensure that regression to the mean following a spike in utilization would be similar in the treatment and comparison groups. For example, **Figure V.3** shows baseline trends in the treatment and comparison groups in emergency department visits. Before matching, the treatment and unmatched comparison groups had very different trends in the quarters preceding enrollment. Matching enables the selection of those from the comparison beneficiaries with the most similar utilization patterns. Trends in other utilization outcomes are provided in **Appendix C**.

Figure V.3. Trends in ED visits among treatment and comparison beneficiaries
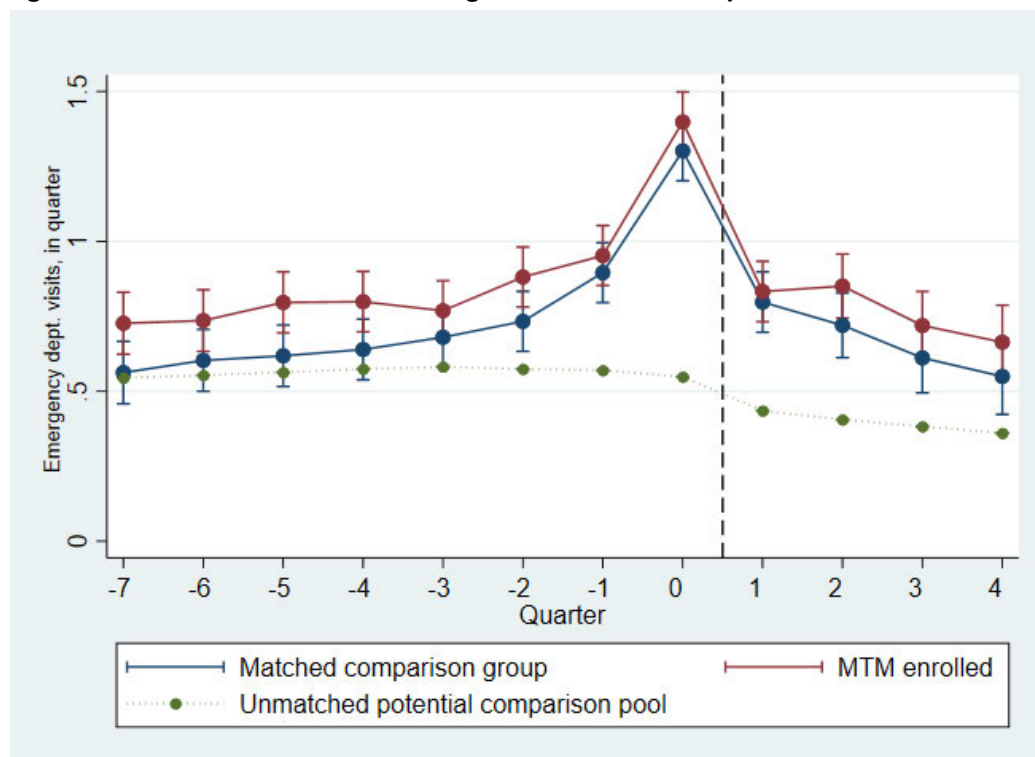
Note: Figure shows trends in mean ED visits per quarter for two years of the baseline period (quarters -7 through 0) and one year of the follow-up period (quarters 1 through 4).

5. Regression analysis

a. Main approach

Mathematica used difference-in-differences design with negative binomial regression for count data outcomes, ordinary least squares for continuous outcome variables, or logistic regression for binary outcomes to estimate the impact of the MTM pilot program on health care utilization. A difference-in-differences design uses a comparison group and data from before and after the intervention period to assess whether outcomes for the treatment group diverge from what would be expected based on the comparison group. This design assumes that the treatment group behaved similarly to the comparison group in the follow-up period. More specifically, the difference between the treatment and comparison groups would remain the same over time, absent the intervention (the "parallel trends assumption"), and that the intervention only affected those receiving meals and not other eligible-but-not-enrolled beneficiaries who live nearby (the "non-interference assumption"). This approach also uses regression control variables to account for any remaining differences in baseline utilization and expenditures between the intervention and comparison groups after matching.

Negative binomial regression is particularly well-suited to count outcomes, such as the number of services received. Evaluators used negative binomial regression for the main count outcomes, including emergency department, inpatient, skilled nursing facility, and physician office services. For congestive heart failure medication adherence, which is measured as a proportion of days and takes values between 0 and 1, evaluators used ordinary least squares regression. Mathematica also conducted ordinary least squares regression on the main outcomes and for the supplemental outcomes as a sensitivity analysis. For binary outcomes, such as mortality or binary versions of count outcomes (for example, "any emergency department visits in a quarter"), evaluators used logistic regression models.

Control variables included demographic characteristics (age, sex, race), eligibility (dually eligible, enrolled in fee-for-service Medicaid, participating in the Coordinated Care Initiative[11]), health characteristics (type of congestive heart failure, comorbidities, Chronic Illness and Disability Payment System risk score), and zip code characteristics (median income, percent in poverty, percent with high school degree, percent with college degree, percent unemployed, racial composition, rural location, indications of living in a food desert). Mathematica also included controls at the county level for the number of recorded COVID cases and average number of hospitalized COVID patients per day in a quarter to account for the timing of various waves of the COVID-19 pandemic, which could have affected health care utilization and mortality risk.

Mathematica included four quarters of data as a pre-intervention period and four quarters of the follow-up period. This final evaluation report includes up to eight quarters of the follow-up period, but evaluators used the models with four quarters of follow-up as the main regression models. **Figure V.4** shows the fraction of the beneficiaries that were observable in each of the analysis periods and indicates a drop off in sample size starting in quarter 5 due to limited

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[11] The Coordinated Care Initiative is a Medi-Cal initiative to integrate medical, behavioral, and long-term care services for low-income seniors and people with disabilities.

follow-up after enrollment for participants who enrolled later in the study period or who exited the pilot program for other reasons.

Figure V.4. Percentage of treatment and matched comparison beneficiaries observable in each quarter
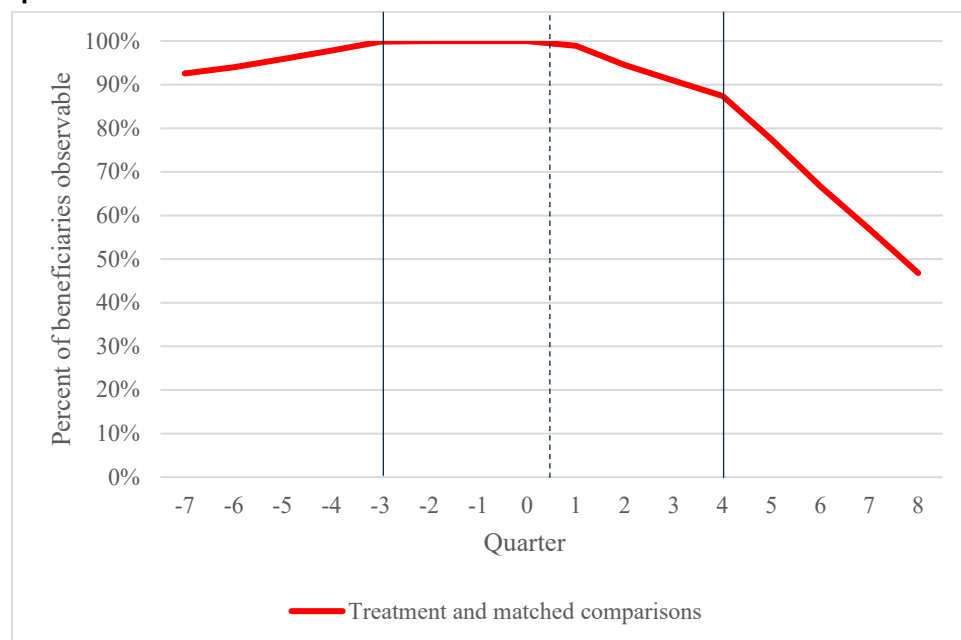
Note: The solid vertical lines indicate the quarters included in the main analysis. The dashed vertical line indicates the start of the intervention.

Mathematica estimated impacts of the MTM pilot program on each outcome variable separately in each follow-up quarter, which enabled evaluators to observe the evolution of the MTM pilot program's impact in each quarter of the follow-up period. Evaluators selected this framework to shed light on whether the program has its biggest impact in the first quarter, while individuals are still receiving MTMs, and fade over time or if impacts take longer to manifest. For more details on the regression model, see **Appendix C**.

In addition to the quarterly framework, Mathematica used semi-annual (six months) and annual models to estimate the average impact across more aggregated periods of time. This approach improved the statistical power to detect the average impact of MTM, but not the impact of the evolution of the program over time.

When studying mortality as a health outcome, evaluators could not use a difference-in-differences approach because only beneficiaries who survived to the follow-up period were included in the study. Therefore, Mathematica used cross-sectional logistic regression analysis to analyze mortality at the beneficiary level over three-, six-, and twelve-month time periods following meal start or pseudo start. Evaluators included only beneficiaries who died or were observable for the full 3-, 6-, or 12-month time horizon in these analyses. Evaluators also include additional control variables that account for medical care utilization in the baseline period. The control variables used for the mortality analyses are in **Appendix C**.

b. Robustness checks

In addition to the main regression model previously described, Mathematica also conducted several checks to test the robustness of the estimates to alternative functional forms, outlier values, and the COVID-19 pandemic. Robustness checks allowed for increased confidence that the impacts seen were not driven by a particular modeling assumption, a handful of beneficiaries with extremely high utilization in a particular quarter, or other external factors such as the pandemic and associated public health emergency. A detailed description of these methods is described in **Appendix C, Section E**.

c. Subgroup analyses

The evaluation included several subgroup analyses to explore whether there was any meaningful variation in the MTM pilot program's estimated impacts among identified subgroups. Mathematica estimated separate impacts independently for each of the following subgroups:

1. Beneficiaries who received all 12 weeks of MTM and attended at least two medical nutrition therapy sessions
2. Dually eligible beneficiaries
3. Non-White and/or Hispanic beneficiaries
4. Beneficiaries with higher expected health care spending
5. Beneficiaries with diagnoses targeted by the Medi-Cal MTM expanded eligibility group
6. Beneficiaries in each of the eight pilot program counties

d. Statistical power

Due to the small scale of the pilot program, statistical power was sometimes limited, especially when using subsamples. Impact estimates for rare outcomes can be noisy even when the full sample (N = 783 enrolled beneficiaries were used. Based on power calculations conducted before the start of the evaluation, Mathematica determined that the analyses were sufficiently powered to detect estimates of similar magnitude to those found in studies of other MTM programs for the five main outcomes: emergency department visits, inpatient stays, skilled nursing facility stays, prescription drug adherence measures, and outpatient office visits.

The main approach estimated quarterly impacts of the MTM pilot program to uncover any patterns where impacts would be largest, such as in the first quarter of the program when beneficiaries received meals and MNT sessions. The evaluators also estimated impacts for semi-annual models (six-month intervals) and annual models (12-month intervals) to consolidate impacts across multiple quarters and increase the precision of the statistical estimates. When quarterly impacts were similar within these semi-annual or annual periods, evaluators report more precise impacts from these more aggregated time periods. For example, if estimated impacts for quarters 1 and 2 were similar, and impacts for quarters 3 and 4 were also similar, the report includes semi-annual impacts because they were more precise.

VI. Findings: Implementation Evaluation

> **Key takeaways**
>
> - Agencies reported that the biggest barrier to implementation was difficulty obtaining participant referrals, which was often due to complicated referral processes or competing priorities at referring organizations. Agencies tailored their outreach and recruitment approaches to their local communities, the needs of their participants, and their organizational capacities to meet enrollment targets.
>
> - To optimize the intervention's effectiveness, agencies created menus and adapted the medically tailored nutrition therapy experience to meet the unique needs of participants with comorbid conditions, such as diabetes or chronic kidney disease.
>
> - Dietitian staff adapted the pilot program's MNT approaches and materials to maximize accessibility, including hiring bilingual staff, relying on visual aids and simplified content for participants with cognitive challenges or limited literacy, and providing supplemental information for participants with comorbid conditions.
>
> - Participants overwhelmingly liked the food and reported positive experiences with meal delivery. They also generally valued working with dietitians and believed their caring, nonjudgmental personalities facilitated engagement and encouraged them to reach their health goals. Many participants felt that the program prepared them for lasting change.

The implementation evaluation considered all aspects of the pilot program experience. This included the start-up process and the day-to-day operations for outreach and referrals, enrollment, meal preparation and delivery, and MNT. The COVID-19 pandemic was ongoing during part of the pilot program period, so Mathematica explored changes to implementation that were instituted during the COVID-19 pandemic.

The first round of the implementation evaluation examined the experiences of the implementing agencies and participants from the onset of the pilot program through December 2020. Mathematica conducted interviews with agency staff from July to November 2020 and asked them to reflect on their experiences from the onset of the pilot program through the interview date. The evaluators conducted focus groups and interviews with participants from September to October 2020. Some participants had completed or withdrawn from the pilot program several months prior to the interview and others closer to the date of the interview.

The second round of data collection included virtual site visits with three implementing agencies from December 2021 through February 2022. These site visits occurred after three full years of pilot program experience and focused on gathering agency impressions of implementation barriers and facilitators, insights into program sustainability, and lessons learned. Mathematica conducted additional interviews from March through May 2022 with participants who completed the pilot program between May 2021 and the end of the year.

A. Outreach and referrals

1. Agency experiences

During key informant interviews conducted in 2020, agencies described a slow start to obtaining referrals and enrolling participants. A few agencies did not anticipate the level of effort required to obtain referrals and had limited resources available to devote to conducting outreach. Agencies reported that certain eligibility criteria limited the pool of eligible participants, including the requirement for 12 months of continuous Medi-Cal coverage. Additionally, some of the eligibility criteria were hard to verify, such as having a prior physician visit.

Over the course of the pilot program, the COVID-19 pandemic changed referral patterns for services for many agencies, but not in the same way. For large agencies located in urban areas, including Project Open Hand, Mama's Kitchen, and Project Angel Food, the pandemic initially triggered an increase in service demand – not just for the pilot program, but for their overall meal delivery programs. Mama's Kitchen reported a 60 percent increase in referrals during the pandemic, Project Angel Food a 50 percent increase, and Project Open Hand a 45 percent increase. Project Angel Food attributed the rise in demand to engagement from social workers who referred many people within their network who were in need during the pandemic. The agencies accommodated the increase in demand by making routes more efficient for drivers and by relying on either increased staffing or volunteers. As the pilot program progressed, as indicated in 2021–2022 site visit interviews, agencies found that referral rates fluctuated. They attributed these fluctuations to the ongoing COVID-19 pandemic and reduced the capacity of referring entities like hospitals and other provider facilities to focus on the pilot program.

To address enrollment challenges throughout the pilot program, agencies strengthened their provider referral networks, targeted outreach to new referral partners, or leveraged existing referrals to their general nutrition programs. Project Angel Food, The Health Trust, Mama's Kitchen, and Ceres Community Project leveraged existing referral networks and/or expanded them. For example, Mama's Kitchen leveraged existing relationships with two local Medi-Cal managed care plans, as well as local cancer and HIV-related providers, to drive more referrals into the pilot program. Project Angel Food, a large organization with significant preexisting community presence in a densely populated geographic area, started the pilot program with a network of 200 potential referring organizations. This network was composed of local providers, health plans, and community-based service organizations. The agency first sought to leverage this existing network and agency staff collaborated with discharge coordinators at local hospitals to encourage referrals to the pilot program. When this attempt was unsuccessful, the agency hired dedicated outreach staff from within their agency to meet with and educate personnel at the provider locations. This strategy was effective in increasing the number of referrals the agency received.

In addition to building on existing relationships, smaller agencies with less expansive referral networks conducted targeted outreach to connect with new partners. For example, the Health Trust invested resources in connecting with cardiology departments in local health care systems. They found that these providers spread the word about the program to other local health care providers. Mama's Kitchen also described targeting social workers and providers at local hospitals.

Many agencies cited the importance of finding a "champion" at referring entities to successfully obtain ongoing referrals. A couple agencies described thoughtful approaches to quality relationship building within referral organizations, emphasizing the importance of finding the "right" person to speak to within an organization and being consistent and courteous in communications with them.

///////////////////////////////////////

"What we try to do from our end is make the [referral] process as simple as possible and to be as supportive as possible to the institutions that are making the referrals into our system... the initial hurdle of introducing ourselves into the healthcare system is one of the barriers, but then looking to work in a collaborative manner with those healthcare institutions also becomes really critical."

— Agency CEO

Some agencies redirected referrals to their other food programs if they identified eligible candidates, taking the opportunity to educate referring providers about the pilot program. For example, Project Open Hand and Food for Thought drew eligible candidates from referrals to their general programs by searching for candidates that met pilot program criteria. Project Open Hand reported that this approach yielded about 60 percent of its participants. Although this strategy was successful, it relied on a substantial existing referral network and a sufficient population of eligible individuals in the community. Therefore, this may not be an option that other organizations can replicate. Project Open Hand staff observed that the agency benefited from its longevity in the community, which helped drive referrals.

To assist agencies in connecting with potential participants, DHCS analyzed data on a quarterly basis to send agencies a list of eligible Medi-Cal beneficiaries in the county. During interviews in 2020, a few agencies reported finding these lists to be helpful in identifying potential participants. Some agencies used the list to make cold calls to eligible beneficiaries and estimated that about 5 percent of their participants were enrolled this way. The Health Trust described the list as a "good resource" and reported that by the second year of the pilot program, about 20 to 25 percent of its participants came from the list. In contrast, some agencies did not find the lists to be helpful because they provided limited information about participants' needs and did not always have current contact information.

During site visits in December 2021 through February 2022, two agencies reported that they had only conducted limited recruitment from the DHCS beneficiary lists. For example, the recruitment lists supported enrollment during periods with lower referrals numbers; one employee of one agency explained, "We put more effort into sustaining our referrers and doing outreach in that way than relying on the list, but it was a good supplemental way to get some more clients." This strategy was less effective for the other agencies because of the higher level of effort needed to enroll these patients (for example, needing to explain the program and contact providers to obtain information).

2. Participant experiences

In focus groups and interviews, MTM pilot program participants (n = 36 total respondents) reported hearing about the MTM pilot program through a variety of channels, most commonly during or following a hospitalization (n = 13), from a social worker or care manager (n = ▮), or from a primary care or specialist physician or nurse during an office visit (n = ▮). Other participants heard about the program through word of mouth or by contacting agencies to seek food assistance (n = ▮). The remaining participants could not remember or did not report how they heard about the program (n = ▮).

B. Enrollment

1. Agency experiences

Enrollment processes were similar across agencies because of the pilot program's standard enrollment forms and requirements. All agencies reported that, upon receiving a referral or identifying an eligible candidate, they verified eligibility with Medi-Cal and obtained the candidate's health history from the referring provider.

Respondents from all six agencies reported that the time it took to initiate meal delivery for a new participant depended on the timeliness of obtaining information from the referring providers. Once all necessary information was in place, every agency reported being able to deliver the participant's first meals within a few days. Agencies throughout the course of the pilot program pointed to occasional issues with receiving incorrect or out-of-date information from referrers (such as inaccurate Medi-Cal numbers), which created delays of several days to a few weeks in starting the meal deliveries.

With an overall enrollment target of 1,400 beneficiaries in the pilot program, individual agencies established their own informal targets respective to their organization's capacity and county population. Agencies took different approaches to monitoring their progress toward enrollment targets. For example, Mama's Kitchen described consistently meeting its goal of 6 to 10 new participants per month. In another approach, The Health Trust sought to meet monthly enrollment targets, though they exceeded the number of referrals in the first quarter of the year, with less during the remaining months. During site visit interviews in winter 2021–2022, agencies reported that enrollment fluctuated over the course of the pilot program (partly due to the pandemic) and most described lower enrollment in the final year.

Some agencies faced challenges meeting enrollment targets because many otherwise eligible candidates had health conditions or other needs that the agencies could not meet through the pilot program. For example, some agencies could not provide appropriately tailored meals for individuals ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮ They also described having to exclude people because of language barriers or food storage and reheating capacity even if those people could have benefitted from the program. One dietitian estimated that one out of every six people referred to the program was unable to participate in MNT sessions over the phone because of language, physical, or cognitive needs that the agency could not accommodate. These individuals were referred to the agency's nutrition support program.

2. Participant experiences

Participants were motivated to enroll in the MTM pilot program for a variety of reasons. These included improving their health, addressing food insecurity, and supporting themselves when they experienced physical weakness following a hospital stay. About half of the participants mentioned that they wanted to learn to eat healthier as a step toward improving their heart and overall health. They believed the program would help them meet that goal by showing them how to eat a heart healthy diet and by providing meals that would make it easier to stick with such a diet (n = 13 out of 27 responses). As an example, one participant explained that she enrolled "for the food and for the experience and just to see these are the types of foods that I should be eating and stuff like that." Food insecurity was another motivation for joining the program. A few participants expressed that they had been experiencing food insecurity at the time of hearing about the program. They were happy to be receiving food—not because of a specific congestive heart failure diagnosis or event, but because they could not afford food (n = ▊ out of 27 responses). For example, one participant expressed, "[I enrolled because] I guess I had no food and no money at the time." Another said ▊▊▊ was thankful for the program because it "helped [her family] to have some food in [their] stomachs." Several participants mentioned they felt they needed support upon discharge from the hospital because of feeling weak and unable to cook (n = ▊ out of 27 responses). For example, one participant explained she was so weak upon discharge from the hospital following a cardiac event that ▊▊▊ was having trouble walking to the bathroom. ▊▊▊ described having prepared meals ready for ▊▊ to eat as tremendously helpful during ▊▊ recovery. A few other participants wanted to try the program because they thought the food would be good or they wanted to at least try the food (n = ▊ out of 27 responses). One of these participants had previously received meals from the agency and enjoyed them. Another had heard from a relative that the agency provided good food. The remaining participants did not remember or share their initial reasons for joining the program.

Most participants reported that they felt very positive about initially enrolling in the pilot program (n = 23 out of 27 responses). Overall, participants reported few concerns about joining. Of the few participants who expressed concerns, the primary concern (n = ▊) was that the food would not taste good or be healthy. This was based on their prior experiences with similar programs. One participant was also concerned that receiving meal deliveries during the COVID-19 pandemic would possibly expose her to the virus, but ▊▊ felt reassured upon hearing that delivery personnel would practice physical distancing and wear personal protective equipment.

Many participants reported favorable impressions of the enrollment process, and a few

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"It was fairly straightforward. I didn't have a very big lag time. They [could] see in the system somehow that I was eligible through the kind of Medi-Cal that I have."

— MTM client on the enrollment process

described it as very fast (n = ▊). No participants reported substantial challenges with the enrollment process. A few participants (n = ▊) commented that agency staff were accessible and easy to reach, which facilitated smooth enrollment into the program. No participants reported challenges getting in contact with agency staff about the enrollment process. Only one participant reported experiencing a delay in the enrollment process. ▊▊▊ explained that her

health care provider took approximately a week to contact the agency to enroll her in the program, and she was unsure what caused that delay. The enrollment process was otherwise straightforward.

C. Meal preparation

1. Agency experiences

Agencies adapted to the need to provide congestive heart failure-diet compliant meals in different ways. Some were already providing heart-healthy diets that were then supplemented in the pilot program. For example, program participants with Project Open Hand and Food for Thought received the same heart-healthy meals that were delivered to non-pilot program participants, with additional low-sodium items included. In contrast, some agencies redesigned their menus entirely to adapt to the demands of the congestive heart failure diet. Although Mama's Kitchen originally intended to make program participants entirely separate from the general nutrition program, after hiring a new executive chef, they decided to make all meals heart healthy. The agency used the same kitchen, staff, and preparation procedures to produce all meals, with lower sodium in those packaged for program participants. Mama's Kitchen staff stated that the program "elevated some of the other programs" by bringing greater attention to healthy eating. Similarly, Ceres was in the process of revamping its menu when the program began and decided to make all menus heart healthy. Project Angel Food, meanwhile, hired a separate chef to oversee the program meals. They already provided a no-added-salt option for the regular meal delivery program but created a new heart-healthy menu for the pilot program that was more "robust" and had more variety.

Along with ensuring meals were compliant with clinical recommendations for individuals with congestive heart failure, agencies reported trying to accommodate individual participant dietary needs and preferences. Approaches to satisfy participant needs and requests varied by agency and ranged from logging participant needs/preferences in a database during the intake session to discussing participant feedback with individual participants during MNT sessions. For example, The Health Trust and Ceres both described keeping internal databases with participants' dietary needs (such as diabetes, flavor preferences, allergies, dietary restrictions) that they communicated to the vendor or kitchens and used to customize meals for the participants. Taking a different approach, early in the pilot program, Mama's Kitchen described building "intentional relationships" with participants, which allowed them to communicate their dietary needs and allow staff to accommodate these preferences in delivered meals. During site visit interviews later in the program, Mama's Kitchen described that meal adjustments for individual preferences became impossible with the increase in program size over the course of the COVID-19 pandemic. Therefore, they began to offer a selection of meals for more common preferences (for example, no fish, no mushroom, low soy, among others). Focusing on quality from a food production angle, Project Angel Food reported that they shared participant feedback with the kitchens and had a dietitian review the meals each month to ensure quality, portion sizes, and variety. The agency also hired a quality assurance staff person later in the program to monitor the quality of the meals being produced in response to the high volume of meals.

During interviews, some agencies emphasized that they intentionally promoted variety and tried to appeal to participant palates when designing their menus. These agencies have described

prioritizing a diverse menu of foods that look appetizing, and they stressed the importance of serving both unique options and simple, familiar fare to participants.

Some agencies reported being able to accommodate dietary needs for comorbid health conditions, including diabetes and chronic kidney disease. In particular, over the course of the program, Project Angel Food started offering specific meals for participants with comorbid kidney disease or diabetes or both, noting that at the time of the site visit in December 2021, a quarter of its clients had all three diagnoses. Ceres reported working on creating similarly

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"Some of our menus, you might see, have some foods that are interesting and a little bit more dynamic. And then we also have options for simple foods and some comfort foods built in there. So there's a balance of what we're doing, but…we're also focusing on keeping it simple and attainable for them in terms of them setting their health goals and in terms of what we're asking or teaching them to do with their food."

— Agency CEO

tailored menus for these participants.

All three agencies interviewed in December 2021 through February 2022 reported that supply chain and inflation issues affected menu design and meal preparation in 2021. The specific items affected were dairy items or soy milks, proteins, and snacks such as protein bars. The agencies observed increased food costs (with one agency citing cost increases of 30 percent) and said they received government, foundation, and philanthropic support to cover some of the increased costs. They also reported that their chefs worked with dietitians to identify replacements for ingredients or items that were unavailable.

2. Participant experiences

Overall, participants liked the food they received through the pilot program. Many gave the food quality a high rating (n = 23 out of 35 responses), several rated it medium-to-high rating (n = █), and only a few participants gave a poor rating (n = █). Participants reported appreciating different aspects of the food. For example, some liked the variety of vegetables, others liked specific dishes, and some appreciated receiving supplemental bags with fruit and healthy snacks. Only one participant had several complaints about the food. █ did not like the seasoning, feel the food was fresh, or feel there was enough variety. In his words, "they broccoli you to death."

Some participants corroborated that the agencies were able to meet their preferences for specific foods. For example, a few participants reported calling the agencies to request an accommodation of some kind—such as lower carbohydrate options or less seasoning on the food—and receiving the requested accommodation very quickly.

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"As a bachelor, the first thing you do when you get hungry, you want to go to the car and go to McDonald's. I catch myself and say, 'Hold on a minute. You have a dinner here. Just eat this. Why go out?' There's a piece of chicken breast, some broccoli with another vegetable. That's all I need. I got the yogurt they used to send me. I'd eat the yogurt or even eat the bowl of cereal at night. I was fine."

— MTM client on learning to eat healthier

Participants had mixed views as to the quantity of food they received, with several reporting they received too much food (n = ▮ out of 29 responses), approximately half felt they received the right amount (n = 13 out of 29 responses), and a few felt they did not receive enough (n = ▮ out of 29 responses). Of the participants who felt they received too much food, some ended up giving excess food to neighbors or unhoused people in their community. Others reported storing the extra food in the freezer. Although most participants did not perceive the excess food to be a major problem, one participant explained that ▮ dropped out of the program because ▮ was receiving too much food and it was going to waste. Related to this challenge, a couple of participants recommended that agencies give future participants the option to skip a delivery if they accumulate a backlog of meals in the freezer.

Approximately half of participants believed they received the right amount of food, and several of them felt that the portion sizes were helpful in modeling the right amount of food to eat per meal. In one participant's words, "you get that full feeling without overeating." Another participant explained that they had to adjust to eating smaller portions than they were used to eating, but they understood that they had previously been eating too much food with each meal and wanted to learn how to eat less food as part of adhering to a heart-healthy diet. In contrast, a few participants felt they did not receive enough food, primarily because the portions within each meal seemed too small for them. One such participant reported supplementing his meals with other food.

Most participants who commented on food preparation said the food was easy to prepare (n = 18 out of 21 responses). These participants explained that it was simple and straightforward to heat the food in the microwave, and they did not describe any challenges with the process. The remaining three participants felt that preparing the meals was challenging. For example, one reported that assembling salads was difficult because she could only carry one ingredient at a time due to physical disability and she might have to make multiple trips to the refrigerator and back to prepare the salad. The same participant also reported that preparing breakfasts required some creativity because the delivery included several options to mix (such as bananas, yogurt, and oatmeal). A couple participants reported challenges with heating their meals. One explained that they had mobility issues, which made it challenging to retrieve meals from their refrigerator and heat the food in the microwave.

Most participants did not provide suggestions for improving the food, but of those that did, a few participants felt that the food would be improved with more variety (n = ▮). As an example, one participant reported that ▮ received the same meals each week of the program, and while ▮ recognized that the pilot program had to accommodate a variety of people, ▮ did not enjoy eating the same foods every week. Another participant recommended that the agencies give participants the option to select the amount of seasoning on the food, such as mild, medium, or

strong seasoning. A few participants reported that they received large frozen lunches, but they did not receive any or enough breakfast food (n = █). These participants explained that they would have preferred to receive a larger breakfast, either a hot meal or cold items, such as yogurt, oatmeal, and fruit. One of the participants mentioned that ███ takes her medication in the morning with food and that having a larger breakfast would be helpful. The participants also noted they would have preferred a smaller lunch, such as a sandwich rather than a frozen entrée. Other less common suggestions for improving the food included creating a structured menu where participants could select options that appealed to them, the option to indicate specific foods that they did not want to eat, and to provide lower carbohydrate meals to accommodate medical conditions such as diabetes and individual preferences for lower carbohydrate foods. Another suggestion was to provide bottled water rather than juice or milk.

D. Delivery

1. Agency experiences

All agencies described using the same delivery routes and schedules that they had been using for their general nutrition programs prior to the pilot program where drivers delivered to participants listed on a route sheet. The agencies assigned routes to drivers and asked them to verify that the correct packages were delivered to the individuals. The participants were given a delivery window of several hours to be home for delivery.

Agencies asked drivers to conduct wellness checks during deliveries to program participants. The formality and thoroughness of these checks varied by agency. Most agencies asked delivery personnel to fill out a form or checklist assessing the visual condition of the participant (i.e., whether they appeared unwell, confused, in an unsafe situation, or unable to care for themselves) and confirming meal delivery. A few agencies had informal systems in which drivers reported back to the agency only when they observed an issue that warranted attention, such as the participant appearing out of breath or unable to come to the door. Several agencies reported that they trained drivers in what to look for during wellness checks. For example, the drivers learned to assess whether the participant appeared to be in danger, disheveled, unable to care for themselves, or was demonstrating symptoms of respiratory distress or stroke. The Health Trust described having a dedicated phone line for delivery staff to reach the agency during their deliveries if they encountered a participant issue they did not know how to address. The line connected them to staff with access to notes about participants on the driver's route. After mid-2021, when participants went back to work or left home more frequently, some agencies noted increased issues with delivery because participants were less likely to be home during delivery windows.

Prior to the COVID-19 pandemic, delivery personnel would generally have brief conversations with participants on their doorsteps as part of conducting wellness checks. Some would help bring food into the participants' homes or help them with small household chores, such as changing a light bulb. In March 2020, with an increased risk of exposure between delivery personnel and participants, agencies initiated no-contact protocols to increase safety. Across agencies, delivery staff wearing personal protective equipment (such as masks and gloves, with several agencies reportedly also providing hand sanitizer to drivers) dropped the meals off at the doorstep and then stepped back. The staff waited for the participants to step outside to receive the meals—to ensure they received the food and to ensure they were in good-enough

physical condition to come to the door—but did not have prolonged interactions with the participants.

All agencies experienced staffing issues in 2021 for both paid and volunteer delivery positions. They attributed the challenges to increased competition for workers with for-profit companies. Their pool of candidates was also limited by the need for background checks and full COVID-19 vaccination status, given that the position required contact with high-risk individuals. Agencies did find ways to adapt to this shortage and were able to avoid missing deliveries. Mama's Kitchen described adjusting delivery routes to make them more efficient and calling on volunteers last minute to cover routes. Both Project Angel Food and Project Open Hand Alameda sent staff from other departments to help with deliveries.

2. Participant experiences

Many participants reported positive experiences with meal deliveries and did not describe challenges with delivery schedules or personnel. Participants overwhelmingly reported positive feedback regarding meal delivery personnel, such as providing polite service and having caring personalities. A few participants reported that they appreciated the delivery driver calling them when enroute with the delivery. Other participants with mobility issues (who participated in the program prior to the pandemic) appreciated that the delivery personnel helped them put food away or do small household chores, like changing a light bulb or taking out the trash. Some participants also reported that they received extra supplies with their meal deliveries, such as toothpaste, hand sanitizer, and paper towels— which they valued.

Several participants reported that the agencies were flexible and accommodating with meal deliveries. For example, one participant explained that ▇▇ forgot to tell the agency ▇▇ had a doctor's appointment during a scheduled delivery. ▇▇ arrived home to find that the delivery personnel were waiting outside ▇▇ home to ensure ▇▇ received the food, which ▇▇ was grateful for.

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"To have service like that, all I can say is there are a lot of people out there struggling that need help. To have [Project] Angel Food come like that and to help me out when I was not doing good, it was really something to me."

— MTM client on meal deliveries

Although many participants had smooth experiences with meal deliveries, a few participants reported issues with the delivery frequency, time, or communication (n = ▇. For example, ▇▇ participants reported challenges being home during the required window for meal delivery and one participant said the delivery windows were inconsistent and not always clearly communicated. A few participants reported they would have preferred different frequencies for meal delivery (n = ▇). For example, ▇▇ participants reported they would have preferred to receive meals only once a week so that they could better plan when they would eat their food and to avoid having to be home for multiple meal delivery windows. In contrast, ▇▇ participants reported they would have preferred more frequent deliveries because of problems with food storage or so that the food would be fresher.

A few participants reported that they had built meaningful relationships with their delivery personnel and that these relationships were important to their overall well-being. Many participants reported experiencing some degree of social isolation, including a lack of family support. The delivery staff provided important social connection. In some cases, the meal delivery staff even became their primary social contact. This was critical during the pandemic when they were experiencing much more profound social isolation. Some participants felt that, in addition to providing social contact, meal delivery staff went above and beyond their duties. They felt the support the delivery staff provided was an important factor in their healing. In some cases, delivery personnel brought participants flowers and birthday cards along with the food.

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"I haven't met anybody through [the program] that I didn't like, that wasn't kind, gentle, and helpful beyond all reproach. I mean, they were just so helpful and so courteous and so caring and so loving."

— MTM client on meal delivery personnel

Most delivery experiences were positive, but some participants reported challenges with food storage due to having small freezers/refrigerators that could not accommodate a week's worth of meals (n = ▮ out of 27 responses). Others reported that they lived with roommates and "felt bad" that their food occupied a large amount of space in their communal freezers and refrigerators. ▮▮▮ participant reported that the agency was able to deliver meals twice per week instead of once to reduce his need to store meals. ▮▮ further explained that the increased deliveries helped ▮▮, but ▮▮ still needed to store meals with ▮▮ landlady and sister.

E. Medical nutrition therapy

1. Agency experiences

Most agencies relied on existing dietitian staff to carry out the medical nutrition therapy component of the program. Project Angel Food hired a dietitian specifically for the pilot program due to the high volume of participants. Dietitians for Project Angel Food had a caseload of about 30 participants each and received ▮▮ new participants each week. At the program's peak, one of Mama's Kitchen's three dietitians reported spending four to five hours per week on pilot program clients.

Dietitians described a consistent structure to the MNT sessions based on the shared educational materials that were created for the pilot program. They individualized their approach to using the materials based on participant readiness for change and responsiveness. Across agencies, dietitians conducted intake sessions prior to initiating meal delivery to assess the participant's baseline health. The initial assessment covered participants' overall health and the status of their congestive heart failure symptoms; medications and current behaviors (such as weighing themselves); eating habits and beliefs; living situations and supports; allergies; and other issues (diabetes or dental issues) that could affect their ability to engage with the program. Dietitians used this information to better understand participant barriers to learning and behavior change, tailor their MNT to be most effective, and make sure the meals met their individual needs.

The first MNT session (sometimes during intake) involved establishing participants' initial health goals and outlining expectations for participation in the program including communication and availability for deliveries. This session also involved reviewing the first section of the pilot program's education booklet, which included reading labels, food preparation and seasoning, and some heart-healthy recipes. In the second and third sessions, dietitians reviewed the next section(s) of the booklet with the participant and discussed their progress on health goals, provided guidance on how they could cook healthy meals for themselves, and discussed their satisfaction with the meals they'd received. In the final session, dietitians said they finished the booklet and focused on making food choices and reading labels. Dietitians reported that the number of sessions was appropriate, but at least one dietitian said they combined the second and third sessions because the material for the third session was short and seemed to cover things like basic cooking that the participants already knew.

The dietitians reported that they focused on the contents of the education booklet, but they recognized that the needs of each participant were different and adapted their approach as needed. One dietitian noted that participants enrolled in the program had varying prior experiences with dietitians and managing their diagnosis of congestive heart failure. Some needed "fine tuning" and support for ongoing change, whereas others "[were] in denial and never learned how to manage their disease" and needed more intensive education in the material. Dietitians also described finding the balance between being sensitive to those differences in participant readiness and the goals of the pilot program: "[W]e're really working with what they have available and bridging those gaps…. We're also focusing on keeping it simple and attainable for them in terms of them setting their health goals and in terms of what we're asking or teaching them to do with their food."

Over the course of the program, agencies increased their efforts to tailor MNT and resources toward individual needs. Dietitians at all three agencies adapted the program materials for each participant. They took into account their readiness to learn, existing knowledge, and the accessibility of the sessions and materials. They also hired Spanish-speaking dietitians and provided supplemental information on nutrition for comorbid conditions. This included adapting materials for people with cognitive challenges or limited literacy. The adaptations included the use of pictures, creating visual materials, simplifying the written lessons, and/or shortening sessions for participants who struggled with long phone conversations.

The MNT sessions were not disrupted during the pandemic. The only change to the MNT (as a result of the COVID-19 pandemic) was that the agencies changed their in-person intake sessions to remote formats and removed in-home visits by dietitians. Most agencies reported no challenges with holding their sessions remotely, but a few dietitians noted that not being able to see participants in their home environment made it difficult to understand their eating habits and identify barriers to behavior change.

Dietitians and program leaders reflected on outcomes from the MNT sessions over the course of the pilot program. All agencies received feedback that most clients were receptive and grateful for the information and felt that the intervention was helpful for their mental and physical health. Dietitians highlighted that by providing participants tools through MNT sessions to manage their own health through the MNT sessions, it made those individuals feel more in control and helped improve their emotional well-being.

"This client said ▮▮ was ▮▮▮▮▮▮▮▮▮▮▮▮▮▮, and ▮▮▮▮ [about ▮▮ ▮▮▮▮▮▮ ▮▮▮], sleeping all day.... [S]omeone finally ▮▮▮▮▮▮▮▮. And it was our [dietitian]."

— Agency staff

"[The dietitian was] always pushing me…not pushing me in a bad way. It was giving me the opportunity and the goals… it was awesome. It was awesome to speak to her... She would say, 'How's the meals?' and 'You're fine. You're going to make it. You're going to [get] there.'"

— MTM client on working with a dietitian

Agency staff also reported that a majority of participants retained the information provided during MNT and changed their behavior after participating in the program. They felt that having meals as behavioral models to complement the MNT sessions was particularly effective.

2. Participant experiences

Many participants reported that the MNT sessions with the dietitians were helpful (n = 26). Participant perceptions of the dietitians were positive. They valued the dietitians', encouragement, accessibility, and caring, nonjudgmental personalities (n = 19). Terms used by participants to describe their dietitians included "nice and very thorough," "just wonderful," and "know[ing] her stuff." Some participants emphasized that they did not feel judged by their dietitian. This was important to them because they felt self-conscious about their weight and eating habits. They expressed that working with a nonjudgmental and caring dietitian allowed them to engage in the nutrition sessions because they felt comfortable being honest and open about their health, health goals, challenges, and to begin making progress toward their goals. Several participants appreciated working with the dietitian one on one to identify steps for improving their diets. They felt that the dietitians made the process feel manageable rather than overwhelming. Some participants also appreciated that their dietitians provided encouragement and accountability by periodically checking in with them to see how they were doing and gently nudge them toward their goals. Other participants appreciated that the dietitians were easy to reach by phone when they had questions or concerns.

"We still don't want to deliver the same program to every person. But just how you communicate with every person is completely different."

— Agency staff

Although many participants found the dietitians to be helpful, a few participants could not recall working with a dietitian (███████████████████████ or did not remain in the program for all the sessions and therefore had little interaction with the dietitians (n = █). Some participants reported already knowing most of the material that the dietitians covered in the sessions and therefore felt the sessions were only somewhat helpful. A handful of Spanish-speaking clients reported that they did not see a dietitian as part of the program (n = █).

Participants had different perspectives as to what the ideal number of MNT sessions with the dietitians should be. A few participants reported that they only needed a couple of nutrition therapy sessions with the dietitian. A few others stated they would have benefited from additional sessions. One of the sessions covered very basic cooking, and several participants felt they already had those skills. In contrast, a few participants felt that additional time with a dietitian would have been helpful because the MTM pilot program booklets contained a lot of information.

F. Participant attrition, program compliance, and perspectives on the potential for lasting change

1. Participation attrition and program compliance

Many agencies identified participant attrition and program compliance as key challenges. One agency administrator mentioned that about 60 percent of participants completed the program. This was defined as receiving all 12 weeks' worth of meals and participating in three MNT sessions. The administrator explained that many participants were not ready to commit to changing their diets and behaviors. Participants unable or unwilling to fully give up other sources of food or who were not interested in the educational component were not likely to

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"She was very encouraging. I would say that, because when I first got out of the hospital, ███████████████████████. I had just been given this huge, shocking diagnosis. Two months before I'm merrily going along and then, all of a sudden, well, that's the way big diagnoses work. You're living your life and then, all of a sudden you get slammed with something. So I would say I was pretty ████████████ and just with the diagnosis and now also faced with these dietary limitations and tracking this and that…. She had this real sense of grace. She said, 'Don't be hard on yourself, it's a learning curve, and it's a new way of living and is not just a strict diet, it's a lifestyle change that you're going to have to transition into'…and she was always very encouraging in addition to all the practical advice that she gave me and guidance."

— MTM client on working with a dietitian

successfully complete the program. To mitigate this challenge, a couple of agencies included an assessment for participant readiness for change as part of their intake process. Some agencies described the ideal participant as one who wanted free food and was prepared for major changes. In the words of one agency CEO, those that "[were] ready for that intervention…the people that were ready to eat healthy, understood that nutrition would impact their health." They worked with referring case managers to identify individuals who were most "ready" to engage in

the pilot program and made expectations clear to the candidates during enrollment to reduce attrition down the road.

Two agencies—Mama's Kitchen and The Health Trust—engaged in frequent communication with participants to improve participant compliance and retention. Mama's Kitchen promoted the pilot program as a special opportunity available to select individuals. This helped encourage participants to approach the program seriously. They emphasized the participants' responsibilities while participating in the program, "When we do intakes, we're also fully explaining what the program is so people can decide to opt out. And they are enrolling with their eyes wide open of the expectations of the program." Mama's Kitchen also noticed that many participants fell out of touch with the program between an intake or MNT session and scheduling their next session. To rectify this, they began scheduling future sessions at each meeting, versus trying to reach people later to schedule, which was time-consuming and inefficient.

Other agencies found alternative ways to prevent participant attrition. These included providing incentives for program completion and leveraging contact with the participant during food deliveries. Food for Thought encountered issues with participants accepting the food deliveries, then avoiding further engagement with the program by avoiding meeting with dietitians or completing surveys. To counteract this, they provided an incentive of two months of meals from their general nutrition program for completing the pilot program and small gift cards for completing follow-up surveys and check-ins. Project Angel Food, Project Open Hand Alameda, and Mama's Kitchen reported using food deliveries to reengage participants who were not responsive to the program. They sent letters with food deliveries informing participants that the deliveries would stop if they did not contact the program to set up an MNT session. Agency staff indicated that these approaches were effective at keeping participants engaged in the program.

Many agencies attributed participant attrition or lack of compliance with social determinants of health and other non-medical factors. For example, participants who needed to work were sometimes unable to take deliveries. Other participants experienced social isolation or technological difficulties (with phones or internet connections) that hindered their ability to communicate with the agencies. Additionally, some participants had dental issues that influenced dietary choices, faced competing priorities and high stress levels, had insecure housing, or had housing that did not have microwaves or sufficient storage space for the deliveries. One dietitian observed that many participants had "chaotic lives" and were "just really stressed out and unwell and overwhelmed psychologically," which made it difficult for them to stay engaged with the program. A couple agencies highlighted that they had purchased microwaves, phone cards, or small blenders (to soften food for participants with dental issues) as needed to help provide support to the participants and encourage their engagement in the program.

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"With this population, a large concern is the social determinants [of health]…in terms of lack of consistent housing. Or they just have so many other things going on that being home and being engaged in a program just isn't feasible currently in their life status. And that's one of the things where, as Food is Medicine agencies, we are not equipped to be complete 360 [degree] social workers. And so, I think, as we were getting more and more engaged with people, we were realizing some of the additional interventions that would be needed that's really outside of our Food is Medicine realm."

— Agency CEO

2. Participant assessments of the potential for lasting change

Attrition and adherence were notable challenges for agencies. During the interviews and focus groups, the participants reported learning a variety of important skills from participating in the pilot program. These included how to make healthier meal choices, read food labels, watch their sodium intake, and eat smaller portions. For example, a few participants explained that they ate a lot of fast food prior to the program, but they learned the importance of eating healthier food and felt better equipped to make healthier choices after their 12-week program ended. Participants described learning how to choose better food and prepare simple meals with healthy options like chicken, vegetables, brown rice, and whole-wheat pasta. Several participants emphasized that they learned how to read food labels and check the sodium content of food, which was difficult for them to do prior to the pilot program. In addition, participants reported that they learned to season food without using salt. They were taught to add fresh garlic, onions, and premade seasonings that do not contain sodium. A couple of participants reported that they learned to eat less food, while still feeling satisfied. One participant reported that ▉ worked on portion control. While ▉ originally felt ▉ was not getting enough food from the program, the dietitian helped ▉ learn to snack on fruit or yogurt and granola to manage ▉ hunger. ▉ said, "the meals when you first saw them, I thought, 'that's a small meal.' After I started reading up and after I had gone to some classes with the nutritionist, I realized that's all you really need. All this is in your mind or it's your stomach telling me we're hungry."

Several participants emphasized that the pilot program reinforced building healthy habits over time. Some explained that upon beginning the program, they were initially overwhelmed with learning how to change to a heart-healthy diet. As a result, they appreciated the 12-week duration of the program and the ability to learn how to eat healthier gradually over time. For example, a few participants specifically mentioned that they appreciated learning from the dietitian in small doses over several weeks. This was especially true for participants who were not used to preparing their own food and needed to make large changes to their diets. These participants reported learning how to watch sodium, eat fiber and whole grains, and eat healthy snacks in between meals. Participants also believed that receiving meals that demonstrated how they should be eating made it easier for them to learn how to change their diets in a lasting way. For instance, several participants thought that receiving ideas for meals in recipe books and receiving actual meals were both helpful for learning how to put knowledge into practice beyond the 12-week program.

"To be honest with you, it's really helping me because it takes a while to develop good habits. It's just like every day you got to choose to tell yourself that I'm going to do better for myself in my diet, and this has helped me to pick better foods and do things."

— MTM client on building habits over time

"It's one thing to learn it, but it's another thing to see it put into practice. Someone could tell you how to drive a car, but would you know how to drive a car? I think seeing it put into practice and actual dishes that are prepared can give you a more sense of 'I can do this.'"

— MTM client on converting knowledge to practice

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VII. Findings: Impact Evaluation

> **Key takeaways**
>
> - Compared to Medi-Cal beneficiaries who did not enroll, MTM pilot program participants, on average, were younger, less likely to be dually enrolled in Medicaid and Medicare and had more severe types of congestive heart failure. They were very likely to use high-cost acute care services in the months prior to enrolling in the program. These differences between participants and nonparticipants highlight the need for a robust matching process to evaluate impacts, as well as caution when extrapolating findings to the broader MTM-eligible population.
>
> - MTM participants were more engaged with non-acute medical care; they had more congestive heart failure medication prescription fills and had more outpatient visits with primary care providers and specialists, relative to comparison beneficiaries in the first one to two quarters of the follow-up period.
>
> - Mathematica did not find sufficient evidence to suggest that MTM participants had fewer emergency department visits or inpatient stays relative to comparison beneficiaries in any quarter of the follow-up period.
>
> - MTM participants spent 53 percent fewer days in an inpatient setting for admissions where congestive heart failure was the primary diagnosis in the first two quarters of the follow-up period.
>
> - Mathematica found mixed evidence to suggest that MTM participants may have decreased their length of stay in skilled nursing facilities relative to comparison beneficiaries in the first year of the follow-up period.
>
> - Mathematica found insufficient evidence to suggest that the MTM pilot program reduced mortality.
>
> - Evaluators did not find meaningfully different MTM pilot program impacts for any subgroups of participants.

The impact evaluation of the MTM pilot program was designed to estimate the causal effect of the intervention on several health and health care outcomes. The evaluation process started by identifying the treated group and the dates members received their first meals. Next, Mathematica constructed a comparison group of Medi-Cal beneficiaries who met all MTM pilot program eligibility criteria and lived in the same program counties as the treatment group with similar attributes, but who did not enroll in the MTM pilot program. After identifying eligible comparison beneficiaries, evaluators carefully matched these the beneficiaries to the treatment group based on characteristics that could be observed in enrollment and claims data. Evaluators then used a difference-in-differences regression analysis to account for any remaining differences in the treatment and comparison groups at baseline and to estimate program impacts on health care utilization and mortality in the follow-up period.

In order to allow for adequate claims runout, Mathematica restricted the sample to participants who started receiving meals by April 9, 2021. Therefore, evaluators could observe only 783 treatment beneficiaries for at least one quarter in the follow-up period. For this reason, they

exercised caution when interpreting results for subgroup analyses because of smaller sample sizes (**Appendix Tables D.9–D.18**).

A. Medi-Cal beneficiaries enrolled in MTM pilot program

Between April 1, 2018, and April 9, 2021, 911 beneficiaries started receiving MTM under the pilot program (**Figure VII.1**). Enrollment was slow in 2018 but picked up in 2019.

Figure VII.1. Trends in MTM program meal start dates, April 2018 through April 2021
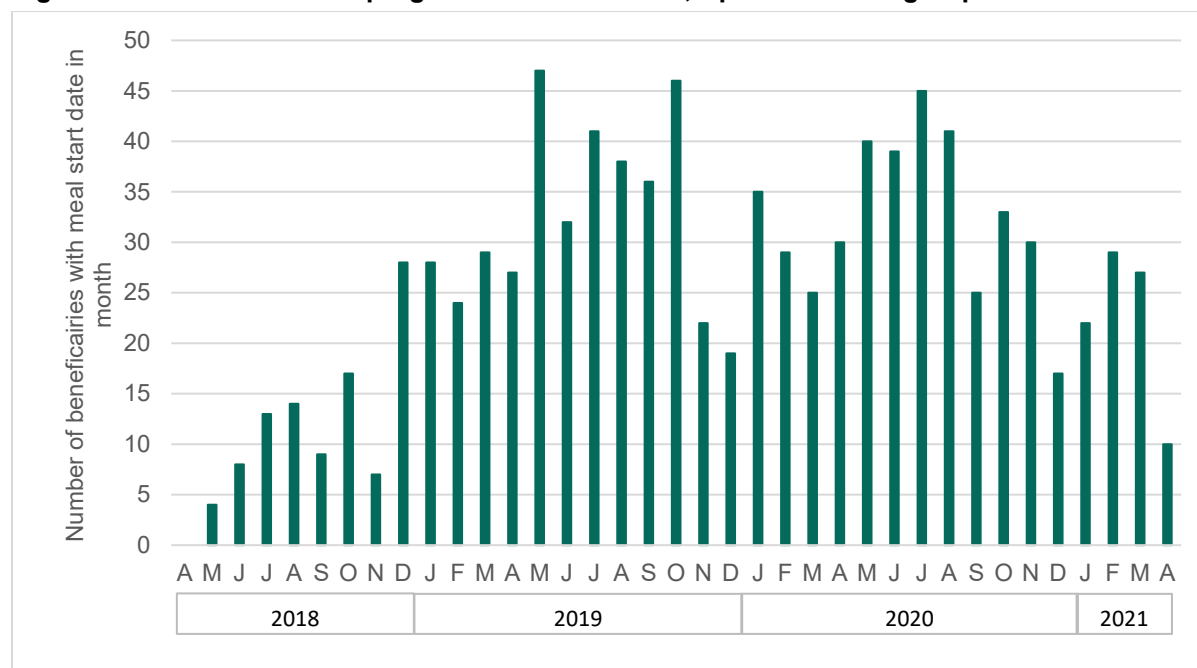
Note: Data on meal start dates from meal-providing agencies.

Over this time period, pilot program enrollment was greater in some counties than others, which partly reflected the population size and Medi-Cal enrollment across counties. For example, no enrollment occurred in Marin County, where Medi-Cal enrollment is low, whereas more than 300 beneficiaries enrolled in Los Angeles County, which has a large population and relatively high proportion enrolled in Medi-Cal (**Figure VII.2**). Because the pilot program was relatively small in size,[12] participants comprised less than 5 percent of those who met the enrollment, diagnostic, and utilization criteria in each county, which supports the within-county comparison group approach that was taken. Since there were many beneficiaries within the program counties who were eligible but never enrolled, there was a large pool to draw from in order to create a well-balanced comparison group of beneficiaries.

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[12] The overall enrollment target for the pilot was initially 1,000 beneficiaries and was later expanded to 1,413 beneficiaries.

Figure VII.2. Number of MTM participants by April 9, 2021, by county
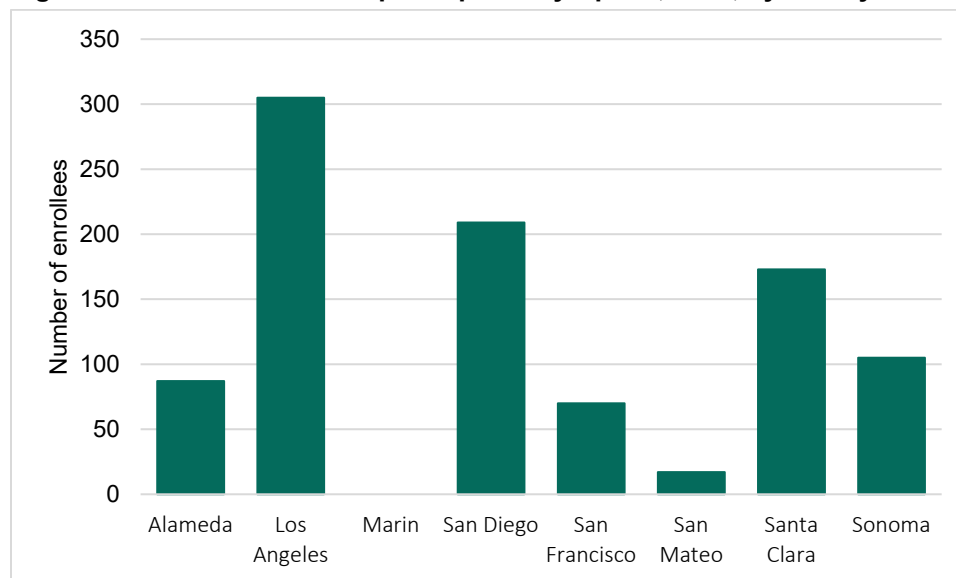
Note: Data on meal start dates from meal-providing agencies.

Mathematica found considerable evidence that enrollment in MTM was not random among those that met Medi-Cal eligibility, diagnostic, and utilization criteria. **Table VII.1** compares the beneficiaries who enrolled in the MTM pilot program to those in the same program counties who were eligible but did not enroll (the pool of potential comparison beneficiaries). The table shows the treatment group mean, the potential comparison group mean, and the standardized difference[13] between the two. Compared to those who were eligible but did not enroll ("matched comparison"), MTM participants were on average younger, more likely to be male, and more likely to be Black. They were less likely to be dually eligible for Medi-Cal and Medicare and less likely to be Latinx or Asian/ Pacific Islander. Participants' health was poorer; MTM participants had higher Chronic Illness and Disability Payment System scores[14] and were more likely to have diagnoses reflecting acute or acute-on-chronic congestive heart failure (indicating more advanced disease) and more likely to have a behavioral health condition. Despite poorer health on average, beneficiaries were less likely to have comorbid end-stage renal disease.[15]

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[13] Standardized differences of 0.25 or less are generally considered small enough to be adequately controlled for by regression analysis. Larger standardized differences indicate the need for additional measures, such as matching, to ensure balance between the treatment and comparison groups on important characteristics.

[14] Chronic Illness and Disability Payment System is a risk adjustment system calibrated to the Medicaid population. The Chronic Illness and Disability Payment System score is a composite capturing the number and severity of health conditions. Higher scores indicate more severe comorbidities. The evaluators used the beneficiary's Chronic Illness and Disability Payment System score as a proxy for overall health. A score of 1.0 indicates that a beneficiary is expected to have expenditures equal to the mean expenditures for the Medi-Cal population, while a score of 6.4 indicates that a beneficiary is expected to cost 6.4 times as much as the mean beneficiary.

[15] End-stage renal disease was listed as an exclusion criterion for the MTM Pilot, but since several enrolled beneficiaries had claims with these diagnoses, they were not excluded from the sample. This diagnosis was matched when constructing the comparison group.

Utilization in the quarter before the first meal start date (or pseudo start date[16]) in the MTM pilot program differed in important ways. Compared to eligible nonparticipants, MTM participants were more likely to visit the emergency department or be admitted for inpatient treatment, less likely to receive care in a skilled nursing facility, and more likely to regularly take congestive heart failure medication. Participants and nonparticipants lived in generally similar ZIP codes in terms of poverty, rural status, and food desert status.

These differences highlight the importance of a rigorous matching protocol to ensure the evaluation captured the true impacts of the pilot program rather than the preexisting differences between participants and nonparticipants. They also raise important questions about the generalizability of the findings if the MTM pilot program were to be scaled up to include more beneficiaries. If scaling up the provision of MTM draws in beneficiaries who are substantially different from pilot program participants, the effects of the program could be quite different from what was estimated here.

Table VII.1. Characteristics of MTM participants and eligible nonparticipants

Variable	Treatment mean (N = 783)	Potential comparison mean before matching (N = 2,247,995)	Standardized difference
Demographics			
Age (years)	59	66	**-0.53**
Male	56%	47%	0.18
White, non-Hispanic	25%	25%	--
Black, non-Hispanic	23%	16%	0.16
Latinx	29%	32%	-0.05
Asian / Pacific Islander	5%	13%	**-0.36**
Other race	17%	14%	0.08
Medi-Cal enrollment			
Dually eligible	31%	52%	**-0.46**
Number of consecutive months enrolled before start date	39	39	-0.01
Diagnoses			
CDPS score	6.4	5.9	0.19
Acute or acute-on-chronic congestive heart failure	71%	23%	**1.08**
Chronic and unspecified congestive heart failure	78%	38%	**0.98**

[16] Potential comparison beneficiaries never enrolled in the pilot program, so they needed to be assigned pseudo meal start dates to assess outcomes over a relevant follow-up period. For purposes of assessing potential selection into the MTM treatment group, evaluators assigned several random pseudo meal start dates to each potential comparison beneficiary and then matched at most one of these comparison beneficiary copies to a treatment beneficiary. More information on the matching process is in Section IV and in Appendix C.

Variable	Treatment mean (N = 783)	Potential comparison mean before matching (N = 2,247,995)	Standardized difference
Right heart failure	6%	1%	0.21
End-stage renal disease	2%	13%	**-0.67**
Behavioral health diagnosis	74%	51%	**0.53**
Baseline health care utilization			
Emergency department visits, 1 quarter before start date	1.4	0.6	**0.37**
Emergency department visits, 2 to 4 quarters before start date	2.6	1.8	0.21
Inpatient stays, 1 quarter before start date	0.9	0.2	**0.61**
Inpatient stays, 2 to 4 quarters before start date	1.3	0.7	**0.32**
Skilled nursing facility stays, 1 quarter before start date	0.01	0.03	-0.17
Skilled nursing facility stays, 2 to 4 quarters before start date	0.05	0.12	-0.21
Proportion of days covered by congestive heart failure medications, 1 quarter before start date	58%	31%	**0.60**
Proportion of days covered by congestive heart failure medications, 2 to 4 quarters before start date	50%	31%	**0.46**
Outpatient visits, 1 quarter before start date	4.3	2.7	**0.42**
Outpatient visits, 2 to 4 quarters before start date	10.1	8.1	0.21
ZIP code characteristics			
Rural ZIP code	0.1%	0.3%	-0.05
ZIP code fraction living in a food desert	5%	4%	0.11
ZIP code fraction in poverty	16%	17%	-0.21

Notes: 1) This table includes only those 783 MTM participants who could be observed in claims data to have met all MTM eligibility requirements. Evaluators excluded 182 beneficiaries from the study because the verification could not be done, using administrative data, that the beneficiaries met the pilot program eligibility criteria. The group of potential comparison beneficiaries include all potential copies of comparison beneficiaries (each with a different pseudo meal start date) that met the MTM eligibility criteria.

2) Bold numbers indicate standardized differences that are greater than 0.25 in absolute value and are therefore generally considered too large to be controlled for using regression covariates alone.

B.   High-cost acute and post-acute care

MTM could affect high-cost health care utilization (emergency department, inpatient, skilled nursing facility) in two primary ways. First, improved nutrition—such as reduced sodium intake—could help participants manage their condition and reduce congestive heart failure symptoms. Second, receiving meals could free up participating beneficiaries' time and monetary resources to invest in their own health. Mathematica did not find sufficient evidence to suggest that the MTM pilot program reduced emergency department visits, inpatient stays, or skilled nursing

facility stays. Evaluators found mixed evidence that the MTM pilot program may have reduced the number of days beneficiaries spent in skilled nursing facility.

1. Emergency department services

Emergency department visits were common in the study population in the baseline period, averaging one emergency department visit per beneficiary per quarter. Using the preferred (negative binomial regression) specification, Mathematica found no statistically significant change in emergency department use in any quarter of the follow-up period (**Table VII.2**). Evaluators also explored of aggregating quarters to the semi-annual and annual level, but found no statistically significant effects. As a robustness check, evaluators also used ordinary least squares regression with beneficiary-level fixed effects to examine impacts on emergency department visits. Quarterly estimates were similar in direction and magnitude to those of the negative binomial regression and were also not statistically significant (**Table D.1**). The results were not sensitive to removing extreme outliers.

Table VII.2. Impact of MTM pilot program on emergency department visits

	N	Treatment group mean	Comparison group mean	Impact estimate (standard error)	Percent impact[a]	*p*-value
Number of emergency department visits, in quarter						
Baseline	4,920	1.0	1.0			
Quarter 1	4,917	0.82	0.87	-0.03 (0.06)	-3.6%	0.59
Quarter 2	4,295	0.86	0.80	0.08 (0.07)	10%	0.26
Quarter 3	3,697	0.71	0.73	0.01 (0.07)	1.0%	0.92
Quarter 4	3,131	0.68	0.66	0.04 (0.08)	6.9%	0.56

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date) and in each quarter of the follow-up period; 31,768 beneficiary-quarters are included.

[a] Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate, divided by the baseline quarterly mean.

Evaluators also explored measures related to emergency department visits. Estimates for emergency department visits with a primary diagnosis of congestive heart failure and ambulance transports were similarly not statistically significant (**Table D.1**). The results from the binary models were consistent with the main findings (**Table D.3**).

2. Inpatient services

Inpatient stays were less common than emergency department visits, but beneficiaries still had approximately 0.6 inpatient stays per quarter in the baseline period. Using the preferred specification, Mathematica found no statistically significant change in inpatient stays in the follow-up period attributable to the intervention (**Table VII.3**). When evaluators aggregated to the semi-annual and annual levels and explored different functional forms, there were no statistically significant results found. Ordinary least squares regression models produced similar results.

Table VII.3. Impact of MTM pilot program on inpatient stays

	N	Treatment group mean	Comparison group mean	Impact estimate	Percent impact[a]	*p*-value
Number of inpatient stays, in quarter						
Baseline	4,920	0.55	0.55			
Quarter 1	4,917	0.39	0.40	-0.01 (0.03)	-1.9%	0.80
Quarter 2	4,295	0.38	0.37	0.02 (0.03)	6.1%	0.53
Quarter 3	3,697	0.34	0.32	0.03 (0.03)	9.7%	0.36
Quarter 4	3,131	0.30	0.29	0.02 (0.03)	6.6%	0.59

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date) and in each quarter of the follow-up period; 31,768 beneficiary-quarters are included.

[a] Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

When considering related measures, Mathematica found no statistically significant impact on inpatient length of stay, stays with a primary diagnosis of congestive heart failure, or stays with intensive care unit or coronary care unit services. The binary model results were found to be similar (**Table D.3**).

Mathematica did find evidence that those participating in the MTM pilot program spent 53 percent fewer days in the hospital for stays with a primary diagnosis of congestive heart failure in the first two quarters of the follow-up period (0.11 fewer days per beneficiary per quarter). This result was robust to excluding outliers.

3.   Skilled nursing facility services

Unlike emergency department and inpatient services, skilled nursing facility stays were uncommon in the baseline period in the Medi-Cal claims data. Mathematica found no statistically significant changes in the number of skilled nursing facility stays (**Table VII.4**). When looking at the number of days beneficiaries spent in a skilled nursing facility, evaluators found a mixture of impacts across the four quarters of the follow-up period, ranging from large decreases to large increases. The full results are available in Appendix D (**Appendix Table D.1**). When aggregating the four quarters to the full follow-up year, evaluators did find a statistically significant decrease of 45 percent in the number of days spent in a skilled nursing facility.[17] In order to reduce the influence outliers have on the estimates, the evaluators winsorizing the data by replacing values above the 98th percentile with the value at the 98th percentile.

Table VII.4. Impact of MTM pilot program on skilled nursing facility stays

	N	Treatment group mean	Comparison group mean	Impact estimate	Percent impact[a]	*p*-value
Number of skilled nursing facility stays, in quarter						
Baseline	4,920	0.02	0.02			

[17] For skilled nursing facility days, we reference the results from the model with winsorized versions of outcome variables that reduce the influence outliers have on the estimates.

	N	Treatment group mean	Comparison group mean	Impact estimate	Percent impact[a]	*p*-value
Quarter 1	4,917	0.02	0.03	-0.00 (0.01)	-18%	0.56
Quarter 2	4,295	0.03	0.03	0.00 (0.01)	19%	0.59
Quarter 3	3,697	0.03	0.02	0.02 (0.01)	82%	0.18
Quarter 4	3,131	0.02	0.03	-0.01 (0.01)	-36%	0.23

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date) and in each quarter of the follow-up period; 31,768 beneficiary-quarters are included.

[a] Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

Estimates from the ordinary least squares model were similar to those from the negative binomial model in sign and magnitude, but they showed statistically significant reduction in days in a skilled nursing facility in the first quarter only and not for the year (**Table D.2**). Results from the binary model were similar in sign to those from the main model, but they were not statistically significant (**Table D.3**).

4. Summary

Mathematica did not find sufficient evidence to suggest that MTM participants had fewer emergency department visits or inpatient stays relative to comparison beneficiaries in any quarter of the follow-up period. Evaluators did find evidence that MTM participants spent fewer days in the inpatient setting for admissions with a primary diagnosis of congestive heart failure, which indicates that while there was no evidence of reduced hospitalizations, MTM pilot participants were likely discharged earlier than comparison beneficiaries. Evaluators further found that MTM participants had 45 percent fewer days in a skilled nursing facility in the follow-up year than matched comparison beneficiaries, but the quarterly impact was inconsistent. Due to the overall noisiness of the data for skilled nursing facility stays, evaluators do not view this as strong evidence that the MTM pilot reduced participants' length of stay in skilled nursing facilities.

C. Preventive services

MTM could increase use of preventive services by freeing up time and monetary resources for beneficiaries to invest in their own health. Beneficiaries could then increase their use of prescription drugs and maintain more regular contact with their primary care and specialist providers. Mathematica found strong, consistent evidence to support this hypothesis; the MTM pilot program increased prescription drug fills and medication adherence, and it increased the number of outpatient office visits with primary care and specialty providers.

1. Prescription drugs

Baseline prescription drug adherence was similar between the two groups. The treatment group had congestive heart failure prescriptions that covered 52 percent of the unique days in the baseline year. The comparison group had congestive heart failure prescriptions that covered 49 percent of the unique days. Using the main ordinary least squares specification for prescription drug adherence, evaluators estimated that there would be an increase of two to three percent (about two to three days per quarter) in the proportion of days covered by congestive heart failure medication in the follow up period. However, the impacts are not statistically significant in

the main model shown in **Table VII.5**. The true impact on prescription drug adherence is better estimated among the subgroup of Medi-Cal only (non-dually eligible) beneficiaries. Dually eligible beneficiaries are likely missing claims or have congestive heart failure prescription medication fill records that are only observable in Medicare data. Section V.E. shows that there is a strong and consistent three to four percentage point increase in medication adherence among MTM participants when restricted to those who are Medi-Cal only.

Table VII.5. Impact of MTM program on use of congestive heart failure medication

	N	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Proportion of days covered by congestive heart failure medication, in quarter						
Baseline	4,920	0.52	0.49			
Quarter 1	4,917	0.63	0.59	0.01 (0.01)	2.2%	0.23
Quarter 2	4,295	0.62	0.57	0.02 (0.01)	3.3%	0.13
Quarter 3	3,697	0.60	0.56	0.02 (0.01)	2.6%	0.30
Quarter 4	3,131	0.59	0.56	0.01 (0.02)	<1%	0.74

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date) and in each quarter of the follow-up period; 14,891 beneficiary-quarters are included.

[a] Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

In related measures, Mathematica also examined the proportion of days covered by subclasses of drugs commonly prescribed for congestive heart failure—including (1) beta blockers and (2) angiotensin converting enzyme (ACE) inhibitors or angiotensin receptor blockers. Evaluators found a three-percentage point increase in the proportion of days covered by beta blockers in the first quarter (statistically significant), but found no statistically significant change in the use of ACE inhibitors or angiotensin receptor blockers (**Table D.1**). Robustness checks showed similar results (**Tables D.2, D.5**, and **D.7**).

Mathematica found somewhat similar patterns for the number of 30-day[18] congestive heart failure prescriptions filled per quarter. Evaluators found a statistically significant increase of about 9 to 10 percent in the number of 30-day fills in quarters 1 and 2 in the quarterly model and a 6.6 percent increase in 30-day fills for the first year in the annual model (**Table D.1**).

2.   Outpatient services

Physician office visits were common at baseline: beneficiaries averaged about 3.5 visits per quarter. Using the preferred negative binomial model relative to the comparison group, the treatment group participants experienced an 11 percent increase in the number of outpatient visits in the first quarter after starting meals (**Table VII. 6**). The difference between treatment and comparison beneficiaries did not persist through the remainder of the follow-up period. Results from the ordinary least squares specification showed a similar pattern (**Table D.2**). Other robustness checks confirmed these findings.

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[18] Evaluators standardized prescriptions to 30 days to create this outcome measure.

Table VII.6. Impact of MTM pilot program on outpatient office visits

	N	Treatment group mean	Comparison group mean	Impact estimate	Percent impact[a]	p-value
Outpatient visits to primary care physician or specialist, in quarter						
Baseline	4,920	3.6	3.4			
Quarter 1	4,917	4.0	3.5	0.39* (0.13)	11%	<0.01
Quarter 2	4,295	3.4	3.2	0.03 (0.13)	<1%	0.81
Quarter 3	3,697	3.1	2.9	0.02 (0.15)	<1%	0.90
Quarter 4	3,131	2.9	2.8	-0.12 (0.16)	-3.9%	0.46

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date) and in each quarter of the follow-up period; 33,290 beneficiary-quarters are included.

* $p < 0.10$.

[a] Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

In related measures, Mathematica separately examined the number of primary care and specialty care visits.[19] The effects seen in overall outpatient office visits appear to be driven by both primary care and specialist visits. Using binary outcome measures, evaluators found a statistically significant increase in the number of MTM participants with any outpatient office visit in the first quarter of the follow-up period (**Table D.3**) This indicates that the MTM pilot program increased the use of outpatient services by beneficiaries who otherwise would have not used them.

3. Summary

Our results indicate that, relative to comparison beneficiaries, treatment beneficiaries increased their use of prescription drugs in the follow-up period, as measured by both prescription drug adherence (proportion of days covered) and total prescriptions filled. MTM participants also increased their use of outpatient physician office visits in the first quarter of the follow-up period. Providing beneficiaries with medically tailored meals may have freed up more time or monetary resources that beneficiaries use to better engage with preventive care services, which may lead to improvements in health or overall wellbeing, even if these impacts are not captured through reductions in acute health care services.

D. Health outcomes

Mortality is high among people with congestive heart failure; more than half of those diagnosed with congestive heart failure die within five years, and sudden death is six to nine times more common among congestive heart failure patients than in the general population (Emory Healthcare, 2019). Improved congestive heart failure management through MTM could therefore reduce mortality.

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[19] Evaluators were only able to classify outpatient visits as primary care or specialty care when taxonomy codes were not missing. Therefore, some outpatient visits could not be classified. Unclassified outpatient visits are included in the aggregate measure, and therefore primary care and specialist visits do not sum to the outpatient visits measure.

Mathematica could not use a difference-in-differences framework to study mortality because only beneficiaries who survived to the follow-up period were included in the study. Evaluators therefore used a cross-sectional logistic regression analysis to study mortality over the 3-, 6-, and 12-month time periods following meal start date or pseudo start date. Even with higher mortality rates among people with congestive heart failure, death is a rare outcome, which means statistical power to study it is limited with the small sample. Evaluators found no statistically significant differences between the treatment and comparison groups when looking at a 3-, 6-, and 12-month time periods (**Table VII.7**). Evaluators could not observe a longer time horizon because there were too few beneficiaries with data past the first year of the follow-up period.

Table VII.7. Impact of MTM pilot program on mortality

	N	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Mortality within 3 months						
Quarter 1	4,351	2.7	3.6	-0.93 (0.67)	-26%	0.16
Mortality within 6 months						
Quarters 1–2	3,931	6.1	6.1	-0.03 (1.0)	<1%	0.74
Mortality within 12 months						
Quarters 1–4	3,020	11	11	-0.12 (1.5)	-1%	0.94

Note: Table shows regression-adjusted treatment and comparison group mortality rates in the first quarter, first two quarters, and first year of the follow-up period.

[a] Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

E.   Subgroup analyses

The evaluation included several subgroup analyses in which evaluators produced impact estimates for each subgroup independently.

1.   Beneficiaries who received all 12 weeks of MTM and attended at least two MNT sessions

In one subgroup analysis, Mathematica contrasted the pilot program's impacts on the 59 percent of participants who received all 12 weeks of MTM and attended at least two MNT sessions (those who "completed" the program) to the 41 percent who did not (**Tables D.9** and **D.10**). Among those who completed the pilot program, evaluators estimated statistically significant reductions in inpatient stays in the first quarter of the follow-up period occurred. However, these impacts may be largely or entirely due to selection. That is, beneficiaries who completed MTM may be different from those who did not in ways that cannot be measured in the data. For those who did not complete the program but received some MTM before discontinuing, evaluators found statistically significant increases in emergency department visits and inpatient stays. Beneficiaries who completed the MTM program may have been more likely to invest in health-promoting activities or they may have had more social supports than those who did not complete the program, which may have resulted in these impact estimates. Although low rates of beneficiaries fully completing the course of meals and nutrition therapy

may mask the true impact of the program as designed, evaluators cannot conclude that the true impact of the program is equivalent to what was observed in the group that received all 12 weeks of meals and at least two MNT sessions because of selection bias.

2. Dually eligible beneficiaries

In another subgroup analysis, Mathematica contrasted the impacts on the 29 percent of beneficiaries who were dually eligible for Medicare to the 71 percent who were eligible for Medi-Cal only. Importantly, the data for dually eligible beneficiaries was less complete than those who were enrolled in Medi-Cal only. For example, dually eligible beneficiaries had implausibly low rates of medication adherence (baseline rate of 5 percent of days in the enrolled group) compared with those who were enrolled in Medi-Cal only (71 percent of days in the enrolled group). Therefore, evaluators view an analysis of Medi-Cal only beneficiaries as a chance to estimate impacts for a subset of beneficiaries where the data is more complete. One important limitation is that the populations of dually eligible beneficiaries and Medi-Cal only beneficiaries are different. For example, dually eligible beneficiaries have higher rates of skilled nursing facility stays than those who are eligible for Medi-Cal only.

In both groups, Mathematica similarly found no evidence of the reduction in emergency department visits and inpatient stays as was the case in the main sample that included all enrolled beneficiaries (**Tables D.11** and **D.12**). Evaluators found statistically significant reductions in skilled nursing facility stays among those who are dually eligible, but not in the non-dually eligible subgroup. This is likely because dually eligible beneficiaries had higher baseline rates of skilled nursing facility stays, which were quite rare in the Medi-Cal only population at baseline (about one skilled nursing facility stay per 100 Medi-Cal only beneficiaries per quarter).

Evaluators found statistically significant patterns of increases in prescription drug adherence and outpatient office visits for the non-dually eligible group. The fact that there are strong increases in outpatient services and prescription drug use for Medi-Cal only beneficiaries elicits more confidence in the fact that these effects are because the data is more complete for these beneficiaries.

3. Non-White and/or Hispanic beneficiaries

Mathematica assessed whether the MTM pilot program had similar impacts for the 75 percent of beneficiaries who identified as non-White and/or Hispanic beneficiaries versus the 25 percent who identified as White and non-Hispanic (**Tables D.13** and **D.14**). Both groups had statistically significant increases in outpatient office visits in the first quarter of the follow-up period, but there were no observable differences in acute health care utilization during that same period in either group. There was a reduction in skilled nursing facility stays among White, non-Hispanic beneficiaries in the first quarter of the follow up period, but White, non-Hispanic beneficiaries also had higher rates of skilled nursing facility stays than did those that were non-White and/or Hispanic.

4. Beneficiaries with higher expected health care spending

Mathematica compared the impact of the MTM program on the 57 percent of beneficiaries with Chronic Illness and Disability Payment System scores above the median (higher expected

health care spending) to the 43 percent of beneficiaries with Chronic Illness and Disability Payment System scores below the median (**Tables D.15** and **D.16**). The Chronic Illness and Disability Payment System score is a risk-adjustment metric that predicts future health care spending; higher numbers indicate higher predictions of future spending. This subgroup analysis enabled the understanding of whether the MTM pilot program had different impacts on beneficiaries with relatively higher or lower health care needs. Overall, evaluators found no evidence for the reductions in emergency department visits, inpatient stays, or skilled nursing facility stays for either group. Those with lower Chronic Illness and Disability Payment System scores had statistically significant increases in congestive heart failure medication adherence and outpatient office visits in the first two quarters of the follow-up period.

5. **Beneficiaries with diagnoses targeted by the Medi-Cal MTM expanded eligibility group**

As part of the CalAIM initiative, the state expanded its offering of MTM to beneficiaries with a broader set of diagnoses, including HIV/AIDS, chronic obstructive pulmonary disease, malnutrition, diabetes, end-stage renal disease, late-stage chronic kidney disease, and cancer. Mathematica identified a subgroup that had one or more of these diagnoses, in addition to congestive heart failure, which allowed the testing of whether the MTM pilot program would have different impacts on the 78 percent of participants with comorbidities versus the 22 percent targeted by the CalAIM MTM group who had congestive heart failure but no other comorbidities (**Tables D.17** and **D.18**). Those with multiple comorbidities may benefit more from MTM than those without such comorbidities, but some meal-providing agencies have difficulty customizing meals for beneficiaries with multiple comorbidities that require different dietary needs. Evaluators found evidence that there were increases in congestive heart failure medication adherence and outpatient office visits in the first quarter of the follow-up period – with continued increases in medication adherence for quarters 2 and 3 – for those beneficiaries with congestive heart failure but without comorbidities targeted by the broader MTM plan in CalAIM. This indicated that there may be impacts for beneficiaries with less complex disease profiles, but smaller or no impacts for those with more complex profiles.

6. **County-specific impacts**

Evaluators estimated county-specific impacts for the MTM program to test whether different agencies in different counties might achieve better or worse outcomes. Given that enrollment in some counties was very low, evaluators could only feasibly test county-specific impacts for counties with higher MTM enrollment. Overall, county-specific impacts were similar to the overall impacts and are not reported individually.

F. Limitations

The evaluation is not a randomized controlled trial; Mathematica used observational data to study a program in which enrollment was optional, and therefore the results should be interpreted with this limitation in mind. First, evaluators cannot rule out that the beneficiaries who enrolled in the MTM pilot program were different in unmeasured ways from those who did not enroll, even though evaluators created a closely matched comparison group that exhibited the same baseline trends in key outcome variables. Importantly, these unobserved differences could bias the results. This concern is, for example, relevant to the measures of outpatient office

visits. Given that providers play an important role in referring and enrolling their patients in the MTM pilot program, evaluators cannot rule out that the measures of outpatient office visits were capturing preexisting differences related to physician engagement between treatment and comparison beneficiaries, rather than an impact of the program.

Of particular concern is selection into the pilot program from agency screening. The implementing agencies discovered that beneficiaries who were not ready to make significant changes to their diet were more likely to drop out of the program. Such beneficiaries may also have been less likely to enroll in the first place. If readiness to change is a key driver of outcomes independent of the MTM pilot program and the treatment group includes a disproportionate share of those who were ready to change because agencies actively screened out others, the results may be biased in favor of finding impacts of the pilot program.

Second, the evaluation used an intention-to-treat analysis, meaning that evaluators included outcomes for the 41 percent of beneficiaries who did not complete the 12 weeks of meals and at least two MNT sessions. Including outcomes for participants who did not receive the full intervention biases the estimates toward zero, away from finding a statistically significant impact, and is therefore a conservative assumption. However, evaluators learned through the implementation evaluation it was discovered that some beneficiaries were transitioned to other agency programs and continued to receive meals after their 12-week MTM pilot program period ended. The longer meal duration created a more intensive intervention than the MTM pilot program envisioned, which could have introduced bias in the estimates of impact of the 12-week program alone. It is not clear which of these biases dominates, so the results must be interpreted with these issues in mind. In the analysis of those who received 12 weeks of meals and at least two medical nutrition therapy sessions, evaluators found large reductions in their use of high-cost acute care services like emergency department visits and inpatient stays (Section V.D.1). Unfortunately, it is impossible to disentangle the impacts of fully completing the program from the fact that those who complete the program might be different in other ways that can't be controlled for in the data. Those who complete the MTM program may, for example, have more social supports, which might also be correlated with lower future health care utilization and better health outcomes, thereby confounding the impact estimates.

Third, the data was likely incomplete for dually eligible beneficiaries. This study only had access to Medi-Cal claims and therefore did not observe any utilization paid for solely by Medicare or other payers. Because California is a "lesser-of" state, Medi-Cal does not pay for services when the share of the Medicare payment is greater than what Medi-Cal would have paid for the service. This lack of data would tend to bias the estimates toward zero. Evaluators conducted subgroup analyses in order to analyze dually eligible and non-dually eligible beneficiaries separately to assess the magnitude of this bias. Evaluators found similar results except for medication adherence, which indicated that this data limitation is unlikely to severely bias the impacts for these outcomes. Mathematica concluded that the MTM pilot program increased prescription drug adherence among participants based in large part on the subgroup analysis of Medi-Cal-only beneficiaries.

Fourth, the COVID-19 pandemic occurred in the middle of the evaluation period. During the early months of the pandemic, mortality risk was elevated for all beneficiaries and utilization of health care services lowered as California residents sheltered in place. These changes in behavior during the pandemic could attenuate the impacts of the MTM pilot program during the

period from March 2020 through at least early 2021, when vaccines first became available. Evaluators included a robustness check that excluded the time period of March 2020 and onward from the analysis (**Table D.8**). In this analysis, evaluators found broadly similar results to those that included all time periods, which indicates that the COVID-19 pandemic was unlikely to bias the impact estimates of this evaluation.

Fifth, the cost data was limited to claims that were paid for by fee-for-service (FFS) Medi-Cal. This means evaluators can only observe costs for specific services provided by FFS Medi-Cal for beneficiaries in managed care plans (the majority of beneficiaries), all services for the few beneficiaries covered entirely by FFS Medi-Cal, and cross-over payments for dually eligible beneficiaries. Therefore, the focus of the analysis was on utilization only.

Finally, because this was an evaluation for a small pilot program, the statistical power of the data was limited, but evaluators found statistically significant increases in congestive heart failure medication adherence and outpatient office visits. Based on power calculations conducted before the start of the evaluation, evaluators determined that the analyses were sufficiently powered to detect estimates of similar magnitude to those found in studies of other MTM programs.

VIII. Conclusions

> **Key takeaways**
>
> - Mathematica found strong evidence that the MTM pilot program increased participants' prescription drug adherence, as well as outpatient office visits with primary care and specialty providers.
>
> - This study found no evidence that participants in the program had lower numbers of emergency department visits, inpatient stays, or skilled nursing facility stays. The study found evidence that the pilot program reduced the length of inpatient stays with a primary diagnosis of congestive heart failure and mixed evidence that the pilot program may have reduced the length of stay in skilled nursing facilities.
>
> - The findings indicate that the pilot program improved dietary management of congestive heart failure and relieved burdens associated with food insecurity and meal preparation, freeing up participants' time and resources to invest in their health.
>
> - Interviewed participants generally reported positive experiences in the MTM pilot program.
>
> - Agencies perceived the pilot program to be successful overall and sought ways to continue providing MTM following the completion of the program.
>
> - Participants and agencies expressed a desire for more flexibility. For example, some participants reported preferring more frequent deliveries, whereas others reported wanting less frequent deliveries. Some participants wanted the ability to choose specific foods to eat within a structured menu, and some participants wanted more or fewer sessions with the dietitians. Some agencies and participants also felt that a longer program could be beneficial, especially for participants with more severe conditions.

The evaluation found that MTM pilot program increased congestive heart failure prescription drug use and use of outpatient physician services. The program also reduced the length of inpatient stays where congestive heart failure was the primary diagnosis. However, there was insufficient evidence that the pilot program reduced the number of trips to the emergency department, inpatient, or skilled nursing facility stays. Participants in the MTM pilot program spent fewer days hospitalized with a primary diagnosis of congestive heart failure in the first two quarters of the follow-up period, although these stays comprised only about 10 percent of overall impatient days for MTM participants. Mixed evidence suggested that the MTM pilot program may have reduced the length of stay in skilled nursing facilities among those who had a skilled nursing facility stay in the first year of the follow-up period, but the impact is noisy and highly variable. Therefore, it cannot be determined whether the program had any impact on participants' use of skilled nursing facility care.

The results observed could be a result of improved dietary management of congestive heart failure, as well as from relieving burdens associated with food insecurity and meal preparation, freeing up participants' time and resources to invest in their health. However, Mathematica did not observe large or broad impact on high-cost acute and post-acute care services. Some participants expressed that the support was particularly welcome in the aftermath of a hospitalization and that the program enabled them to focus on their recovery. In addition, participants felt that the education provided to them through MNT, as well as concrete examples

of healthy meals, gave them important skills that will enable them to maintain a healthier diet after graduating from the program. In this final report, the program impacts, when observed, were typically concentrated in the first quarter of the follow-up period, which coincides with the three-month meal delivery period. Longer term effects cannot be ruled out, but limited power due to small sample sizes meant the estimates in later quarters were often imprecise and not statistically distinguishable from no impact.

The impact estimates were in line with the Kaiser Permanente randomized clinical trial (Go et al., 2022). The study found no statistically significant reductions in emergency department visits or inpatient stays, in contrast with several published observational studies, which may be attributable to differences in the programs, study populations, or methodologies. The well-matched comparison group, with very similar baseline trajectories in service use, provided a good counterfactual for beneficiaries enrolled in the pilot program, as evidenced by the fact that the impacts generally align with a large-scale randomized controlled trial that studies a similar program.

Interviewed participants reported positive experiences in the MTM pilot program, even with the adjustments necessitated by the COVID-19 pandemic. Most participants liked the food, and in several cases, agencies were able to accommodate individual requests and preferences. Almost all participants found the meals sufficient, and several reported that they received too much food, suggesting that a less intensive intervention might achieve similar impacts for some beneficiaries. Despite the positive experiences reported by the participants who agreed to be interviewed for this evaluation, agencies perceived that participant drop-out and noncompliance were serious challenges. Later in the program, some agencies grappled with this challenge by notifying participants that meal deliveries would cease if they did not participate in MNT sessions; agencies reported this to be an effective strategy overall.

Another important challenge, particularly during the first year of implementation, was recruitment. After struggling initially to recruit eligible beneficiaries, agencies deployed a variety of strategies to deepen connections with referring partners and increase awareness of the pilot program. Referrals from partner organizations fluctuated with COVID-19 cases, and some agencies reported declines in referrals toward the end of the program as a result of COVID-19 case surges.

Even so, agency leadership was pleased with the success of the program and hoped to continue to promote supportive policies around MTM, in particular the introduction of MTM as a Community Supports [also known as In Lieu of Services (ILOS)] benefit as part of the CalAIM initiative. Wishing to translate their pilot program experience into becoming a long-term, integrated partner in the health care system, CEOs described spending 2021 focusing on sustainability of services. One CEO described that his goals over the last year of the pilot program was "to be a part of that health care system [to develop the] expertise…we need around those areas in order to have conversations with managed care programs, with health care providers, where we're speaking the same language, and they don't see us as an outlier. How do we establish those long-term relationships and become, in essence, integrated into the health care system in a more durable way?"

IX.   Recommendations

The pilot program did not meet its objective to reduce acute and post-acute services use. However, the program did achieve its other goals to improve nutrition, increase engagement with outpatient primary care and specialist visits, and increase prescription drug adherence for beneficiaries with congestive heart failure.

Mathematica obtained valuable feedback on the pilot program's design and implementation through interviews with key informants and participants. This data included themes related to opportunities for improvement, such as: adding dedicated resources for outreach, paying more attention to recruitment and eligibility, improved accessibility for Spanish-speaking participants and other groups, and additional program flexibility.

Invest in more resources for participant outreach. Staff reported that having dedicated resources for recruitment and program infrastructure helped agencies reach additional eligible individuals earlier and allowed for better data collection and follow-up. Investing in outreach also helped build strong relationships with referring sites, which program staff identified as important.

Improve accessibility of the program, especially for participants who are non-English speaking, or who have limited literacy, cognitive or behavioral challenges, or multiple comorbidities. To increase accessibility for non-English speakers, agencies provided materials in Spanish or other languages and hired bilingual dietitians to eliminate the need for translators to build connection with participants. Agencies also provided culturally relevant recipe options. To address limited literacy and cognitive or behavioral challenges, some agencies adapted written materials to include visual teaching tools or simpler content. For participants with comorbidities, some agencies incorporated education on other medical conditions into MNT materials, other agency kitchens provided special menus that met the complex dietary needs of these individuals who otherwise would not have been able to participate. These successful innovations, which generally occurred in a limited number of agencies, should be incorporated throughout the program as best practices.

Emphasize direct contact with participants. Although the delivered meals were a central part of the pilot program intervention, participants and agency staff emphasized that the interactions between agency and participants were also critical to the program's success. By directly observing participants, agencies could identify and respond to their individual needs. For example, most dietitians described the ability to understand each participant's specific needs and then adapt the program to meet participants "where they are at" as key to the program's success.

Continue to rely on experienced community-based organizations to implement the program. The community-based organizations involved in the pilot program drew on local connections to support outreach through existing networks. Participants and agency personnel reported that shared community connections helped agency staff build strong relationships with participants. Further, the agencies' deep experience with vulnerable populations and their knowledge of the community allowed them to remain effective through unexpected challenges, such as the COVID-19 public health emergency. Specifically, they were able to call on local volunteers for operational support and rapidly modify meal delivery approaches. The organizations were also adaptable to individual participants' needs by modifying meals or learning materials.

Increase the length of the intervention. Some agency staff and participants suggested that referrers be able to select different lengths of program participation for their patients based on need, including six months or longer for those with higher needs. To ease the transition out of the program, a few participants suggested including a step-down program of several weeks, with one meal per day along with recipes and shopping lists after the 12-week mark.

Allow participants greater control over the frequency and type of food delivered. Some participants reported that they needed more frequent meal deliveries because of storage issues, but others wanted less frequent deliveries because they found it difficult to be home during delivery windows. Some participants wanted more control to choose the specific foods they liked, and to avoid those they did not, within a structured menu.

X. Implementation Plan/Strategy

ILOS, now known as Community Supports (which includes MTM), are appropriate and cost-effective alternatives to what is covered under Medi-Cal. It is optional for managed care plans to offer these services, and it is also optional for members to receive them. Meals/medically tailored meals include:

- Meals delivered to a member's home immediately following discharge from a hospital or nursing home.

- Meals provided to the member at home that meet the unique dietary needs required for treatment of chronic illness and are tailored to the member's needs by a registered dietician or certified nutrition professional.

- Medically supportive food and nutrition services, including medically tailored groceries and healthy food vouchers.

Individuals who may benefit from this Community Supports component include:

- Those with chronic conditions such as diabetes, stroke, cancer, HIV, cardiovascular disease, or behavioral health disorders

- Those who have been discharged from a hospital or nursing facility with high risk of rehospitalization or nursing facility placement

- Those with extensive care-coordination needs

Medi-Cal covers up to three meals per day and/or medically supportive food and nutrition services for up to 12 weeks or longer, if medically necessary. Meals that are reimbursed by other programs are not eligible for coverage under Medi-Cal and meals that solely address food insecurity will not be covered.

The ILOS – MTM program incorporated some of the following recommendations (DHCS, 2021a):

- Medi-Cal Managed Care Health Plans (MCP) now offers MTM

- MTM included beneficiaries with different comorbidities

- Community Supports increased the length of the intervention to 12 weeks or longer, if medically necessary.

- Increased direct contact with participants through behavioral, cooking, and nutrition education

- Increased the amount of control participants have over the type of food purchased through medically tailored groceries and healthy food vouchers

DHCS continues to strive towards improving the CalAIM Community Supports MTM services and continues to work toward incorporating additional recommendations.

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XI. Program Impact

During the early stages of CalAIM Community Supports MTM planning, DHCS considered early lessons learned from the on-going MTM Pilot Program. Recommendations that were implemented into the Community Supports resulted in 6,400 members receiving MTM or Medically Supportive Food through CalAIM in 2022. Variation in Community Supports MTM program designs and staffing models resulted in different costs. For example, some MTM/medically supportive food programs may include appropriate incremental value-added services that offer a more specialized or intensive model, with related higher staff and facility costs, while others may utilize a less intensive staffing model resulting in lower staff/facility costs.

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Appendix A:
Key Informant Interview Protocols

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Interview Introduction (all respondents)

Thank you for taking the time to speak with us. My name is [NAME], and my colleague is [NAME]. We are from Mathematica, an independent research company, which is evaluating Medi-Cal's Medically Tailored Meals Pilot Program.

We'd like to learn about the Medi-Cal pilot program and what is—and what isn't— going well so far. We'd also like to verify or update some information we read about your program. We are talking to team members at the California Food is Medicine Coalition and each of the six agencies participating in the pilot program. The information you share with us is confidential. We will not include anyone's name in our report.

It is okay if you are not able to answer all our questions.

[Explain elements of consent]: This telephone interview will last approximately one hour. You will be asked about your experiences with the Medically Tailored Meals Medi-Cal Pilot program. Your participation in this interview is completely voluntary, and you may skip any questions you prefer not to answer and stop the interview at any time. Participating in this telephone interview may not benefit you personally, though you may benefit from sharing your experience and reflecting on it. Your comments will help inform policymakers, organizations, and providers about how to adopt and implement similar programs in the future. Results used for analysis will not include your name.

We have a lot of questions, and I want to be respectful of your time. Please forgive me if I interrupt you to move the conversation along.

If you agree, we would like to record this interview as a backup for our note-taking. The recording is for our internal use only. At the end of our study, we will erase it. Would that be alright with you?

[Press record if respondent agrees.]

Before we begin, do you have any questions?

Discussion Guide for California Food is Medicine Coalition Administrator

Respondent and organizational background

Briefly, what is your role at the California Food is Medicine Coalition? How long have you served in this role?

What was the impetus for initiating the Medi-Cal pilot?

Organization's approach to implementation, monitoring, and challenges

We'd now like to ask you some questions about your approach overseeing the Medi-Cal pilot across all the six agencies implementing it.

Enrollment and eligibility

Let's talk about program eligibility and enrollment.

How would you say that client enrollment into the Medi-Cal pilot is going?

- How well is the program meeting its enrollment goals in terms of the number and types of clients that the agencies planned? Which goals have been easy to meet and why? Which have been harder to meet, and why?
- Roughly what percentage of beneficiaries who are approached about this program enroll? What patterns, if any, have you seen in the types of beneficiaries who do or do not enroll in the program despite being eligible?
- How do the enrollment processes vary across the participating agencies?
- Which, if any, enrollment requirements or elements have posed particular challenges to participating agencies?
- How have agencies addressed these challenges?

What, if any, are the processes for determining and confirming client eligibility?

- What, if any, data do agencies use? How do the agencies collect these data to confirm eligibility?
- How do you keep track of these data?

When do agencies disenroll a client? What situations would trigger disenrollment?

Meal preparation

We'd like to turn to a few questions about the preparation of the food that is delivered to the clients.

Could you give us an overview of how meal preparation is going across the agencies participating in the pilot?

What, if any, processes or standards do you use to ensure the meals distributed by agencies meet requirements, such as nutrition guidelines and serving amounts for each food group?

What processes do the agencies use to make sure each meal is tailored to the specific needs of each client (including those with multiple chronic conditions)?

What, if any, processes related to meal preparation are common among agencies? How do approaches to meal preparation vary across the participating agencies?

Do clients need to prepare the food delivered to them? If so, what do they need to do? How does this vary across agencies?

How are you monitoring meal preparation to ensure it's meeting the requirements of the pilot program? What challenges have you heard related to meal preparation?

– Have you heard about any effective strategies for addressing those challenges?

Meal delivery

How do the agencies approach the meal delivery processes? What, if any, processes or standards are common among agencies? How do approaches to meal delivery vary across the participating agencies?

How are you monitoring meal delivery to ensure it's occurring as planned?

– What data do you receive from the participating agencies to monitor meal delivery? In what format is this data? How frequently do you receive the data?

– How do you use these data to monitor deliveries and make improvements? Can you provide an example?

What challenges have agencies encountered related to meal delivery?

– What strategies seem to be effective for addressing these challenges?

Wellness checks

Could you tell us a bit about the wellness checks that occur during the food deliveries?

– What prompted you to include the wellness checks in the pilot program?

– What did you (or do you) hope to gain from the wellness checks?

– Are wellness checks part of a standard protocol or conducted as needed?

  o If they are standard protocol, can you walk us through that protocol?

  o If they are conducted as needed, what prompts delivery staff to conduct a wellness check? How often are they conducted?

– Could you provide some examples of what the wellness checks entail?

Medical nutrition therapy sessions

We'd like to talk about the medical nutrition therapy sessions.

From your perspective, how is the medical nutrition therapy component of the pilot going across the six agencies?

– What is going well? What isn't going so well? Why?

– How similar or different are the medical therapy processes used by the six participating agencies?

– How similar or different is the experience of offering medical nutrition therapy across the six agencies? Why?

– Are some agencies having more success with the medical nutrition therapy sessions? Why?

What is your perception of the dietitians at the participating agencies?

How, if at all, are you monitoring dietitians' work offering medical nutrition therapy sessions to ensure they are occurring as planned?

– What data, if any, are you collecting on the medical nutrition therapy sessions? What is the format of the data you receive? How frequently do you receive the data?

– How do you or individual agencies use those data to monitor the sessions and make improvements?

What challenges have agencies encountered related to medical nutrition therapy sessions?

– Have you heard about any strategies that seem to be effective for overcoming the challenges?

Overall, how effective are the medical nutrition therapy sessions in terms of helping clients make dietary changes?

– In your opinion, what is the value of the medical nutrition therapy sessions relative to the cost of providing them?

Medical nutrition health outcomes and utilization surveys

How are the medical nutrition health outcomes and utilization surveys going?

What are qualities of, or processes used by, the agencies or dietitians that are most successful in encouraging clients to complete these surveys?

What challenges have agencies faced related to the surveys? What has helped agencies overcome these challenges?

Do you have a rough sense of the completion rates for the surveys (that is, roughly, what proportion of the clients in the Medi-Cal pilot have completed the surveys)?

– What factors support clients in completing the surveys?

– What patterns, if any, have you seen in the types of clients who do or do not complete the surveys?

Client attrition

Roughly what proportion of clients haves dropped out of the program altogether? What proportion haves dropped out of medical nutrition therapy sessions but still receives meals?

How does this vary by agency?

– Potential probes:

   o What contributes to clients' dropping out? (Client characteristics? Agency or staff characteristics?)

   o Have agencies found any effective strategies for retaining clients in the program overall or in medical nutrition therapy sessions?

Overall challenges and successes

Overall, what would you say has been the greatest barrier or challenge to overseeing the Medi-Cal pilot as a whole?

Which, if any, aspects of the Medi-Cal pilot have gone particularly well? Why?

How effective do you think the pilot as a whole has been at helping clients reach their health goals? Why or why not?

Program adaptations

Since the start of the pilot, have you changed anything about the approach or your process for overseeing the Medi-Cal pilot?

– What prompted the change?

– How has the change been going?

How have you adapted your approach or processes for administering the Medi-Cal pilot in response to COVID-19?

Lessons learned

What would you say is the most important lesson you have learned from your experience with this pilot so far?

What advice would you give to organizations implementing a similar type of program?

Wrap-up

Is there anything else that you think we should know about the Medi-Cal pilot that you did not have a chance to share with us?

Thank you for your time.

Discussion Guide for Program Directors at Participating Agencies

Respondent background and program impetus

Briefly, what is your role at [agency name]? How long have you served in this role?

What was the impetus for initiating the Medi-Cal pilot?

Agency's approach to implementation, monitoring and challenges

We'd now like to ask you some questions about your approach to implementing specific aspects of the Medi-Cal pilot.

Enrollment and eligibility

How would you say that client enrollment into the Medi-Cal pilot is going?

– Is the program enrolling the number and types of clients that you planned?

How are patients referred to the program?

– From where do you receive referrals?

– We understand that you receive a list of beneficiaries meeting eligibility criteria from the Department of Health Care Services (DHCS). How do you use the list?

o How are beneficiaries selected for outreach, referral to the program, and enrollment?

o Do you conduct outreach to physicians?

o To beneficiaries?

o Do you apply selection criteria to choose beneficiaries or providers to reach out to?

o If so, what are those criteria?

How long does the enrollment process typically take?

Could you walk us through the process of enrolling patients in the program?

– What aspects of enrollment are going particularly well?

o What factors are contributing to these successes?

– Which, if any, enrollment requirements or elements have posed particular challenges to your agency?

o How have you addressed those challenges?

What is the process for determining and confirming client eligibility?

– How do you collect data to confirm eligibility?

– How do you keep track of these data?

Meal preparation

We'd like to turn to a few questions about the preparation and delivery of meals.

Who prepares the meals for the pilot program? (For example:

internal kitchen staff or subcontracted meal preparers)

- If a subcontractor prepares meals, how did you identify [subcontractor name] to prepare the meals?

What processes do you use to ensure the meals meet requirements, such as nutrition guidelines and serving amounts for each food group?

What processes do you use to make sure each meal is tailored to the specific needs of each client (including those with comorbid conditions)?

What do clients need to do to prepare the food delivered to them?

What has been going well with regard to meal preparation?

- What factors have contributed to these successes?

What challenges have you encountered related to meal preparation?

- How have you addressed those challenges?

Meal delivery and wellness checks

How did you initially coordinate and set up meal delivery services for the Medi-Cal pilot?

Have you continued using the same process? What changes have you made to the meal delivery services since the program began, and why?

How is meal delivery going overall?

- What is going well with meal delivery?
  - o What factors have contributed to these successes?
- What challenges have you encountered related to meal delivery?
  - o How have you addressed those challenges?

Could you tell us a bit about how the meal delivery teams conduct the wellness checks?

- Are wellness checks part of a standard protocol or conducted as needed?
  - o If they are standard protocol, can you walk us through that protocol?
  - o If they are conducted as needed, what prompts delivery staff to conduct a wellness check? How often do they occur, on average?
- What is going well with wellness checks?
  - o What factors have contributed to these successes?
- What challenges have you and your staff encountered conducing wellness checks?
  - o How have you addressed those challenges?
- What do you consider to be the value or usefulness of the wellness checks?

How are you monitoring meal delivery, including wellness checks, to ensure it's occurring as planned?

- What data are you collecting regarding meal delivery and wellness checks?
  - o With what frequency do you collect the data?
  - o What mode do you use to collect the data?
- How do you use those data to identify monitor deliveries and make improvements?

Medical nutrition therapy sessions

We'd like to talk about the medical nutrition therapy sessions.

How did you identify a dietitian (or dietitians) for the Medi-Cal pilot?

– Potential probes:

o What qualifications were you looking for?

o Have you worked with the dietitian before?

o If not: how easy or difficult was it to find a dietitian?

o What specific training, if any, did the dietitian participate in to prepare for this work?

How does the dietitian schedule the medical nutrition therapy sessions with the clients?

From your perspective, how are the medical nutrition therapy sessions going?

To what degree are clients receptive to and engaged in the medical nutrition therapy sessions?

How are you monitoring the medical nutrition therapy sessions to ensure they are occurring as planned?

– What data, if any, are you collecting on the medical nutrition therapy sessions?

– How do you use those data to monitor the sessions and make improvements?

What is going well with the medical nutrition therapy sessions? What contributes to these successes?

What challenges have you encountered related to medical nutrition therapy sessions?

– How have you addressed those challenges?

Medical nutrition health outcomes and utilization surveys

How are the medical nutrition health outcomes and utilization surveys going?

Who from your program is responsible for administering the surveys? (For example, the dietitian, other staff)

What's going well with the surveys?

What challenges have you faced related to the surveys?

Roughly what proportion of clients have completed the surveys?

– What factors support clients in completing the surveys?

– Have you found any strategies to help with survey completion?

– What are qualities of, or processes used by, the staff that are most successful in encouraging clients to complete these surveys?

Client attrition

About what proportion of clients have dropped out of the program?

– Potential probes:

o What contributes to clients' dropping out?

o Have you found any effective strategies for retaining clients?

Agency readiness and implementation experience

Organizational fit

How does the Medi-Cal pilot fit into your organization's other work?

– Have you run into any challenges incorporating the pilot program into your normal operations? For example, do you feel like the Medi-Cal pilot has any conflicting goals relative to your normal operations, or requires any conflicting approaches?

– How have these challenges conflicts been resolved?

Readiness

To what extent to do you feel that your agency and staff were prepared to implement the Medi-Cal pilot at the onset?

– What kinds of training did your staff require to implement the program?

  o Who provided this training?

– Have you had to hire anyone with a certain skill set in order to carry out the program?

  o What skill set?

  o How easy or difficult was it to recruit the staff you needed?

– Including staff on the meal delivery teams and the dietitians, are there any common qualities among the staff who are best suited to carry out the pilot program?

Program adaptations

Since the start of the program, have you or your organization changed anything about its approach or process?

– What prompted the change?

– How has the change been going?

How have you adapted your approach or processes for participating in the Medi-Cal pilot in response to COVID-19?

Overall successes

What aspects or features of your agency or your staff have been critical to your successes implementing the Medi-Cal pilot?

How effective do you think your program has been at helping clients reach their health goals? Why or why not?

Lessons learned

What would you say is the most important lesson you have learned from your experience implementing the Medi-Cal pilot so far?

What advice would you give to others implementing a similar type of program?

Wrap-up

Is there anything else that you think we should know about the Medi-Cal pilot that you did not have a chance to share with us?

Thank you for your time.

Discussion Guide for Registered Dietitians

Respondent and organizational background

How long have you been a registered dietitian?

How long have you been connected with [agency name]?

– Did you work with [agency name] before joining the Medi-Cal pilot program?

How much of your time is dedicated to the Medi-Cal pilot? About how many Medi-Cal pilot clients do you work with?

Overall perception and experience of the Medi-Cal pilot

What is your overall perception of the Medi-Cal pilot? How has it been going?

– What has been going well, and why?

– What has been challenging, and why?

What is your workload like for the pilot program?

– If applicable: How does the pilot fit in with the rest of your work?

– What kind of caseload do you have for the Medi-Cal pilot?

To what extent did you feel prepared to begin as a dietitian for the Medi-Cal pilot?

– What additional training did you need to serve Medi-Cal pilot program clients? Who provided that training? Was it sufficient?

Medical nutrition therapy sessions

We understand that the pilot program requires each client to participate in four medical nutrition therapy sessions. Could you tell us a bit about how you conduct the initial assessment with new clients?

– Potential probes:

   o How do you conduct the outcome measures questionnaire? The nutrition assessment?

   o Could you tell us a bit about what the intervention plans look like?

   o What else do you cover in the first session?

– Could you tell us a bit about how you conduct the other three medical nutrition therapy sessions?

   o What kinds of topics do you cover in the second and third sessions?

   o What kinds of topics do you typically cover in the closing session?

– To what extent do you conduct sessions in person versus over the phone?

   o What differences do you notice in conducting the sessions in-person versus over the phone?

– How would you change the sessions, if at all, to make them more helpful to clients?

What kind of educational materials do you provide to clients?

    – Where do you get the educational materials?

    – What components of these materials do you think are most helpful in changing clients' knowledge and behaviors?

What aspects of medical nutrition therapy sessions have been going well?

    – What factors have contributed to these successes?

What challenges have you faced relating to the medical nutrition therapy sessions?

    – What strategies seem to help with these challenges?

Client engagement with sessions

How do clients react to the medical nutrition therapy sessions?

    – What do they like and dislike and why?

    – To what extent do they seem to be engaged in and receptive to the therapy sessions and educational materials?

To what extent have you seen clients drop out of the program?

    – To what extent have you seen clients drop out of the medical nutrition therapy sessions but remain in the pilot (and receive meals)?

    – How do you identify clients at risk of dropping out of the medical nutrition therapy sessions or the Medi-Cal pilot overall?

    – What patterns, if any, have you seen in the types of clients who drop out of the medical nutrition therapy sessions (or the pilot program completely) compared with those who do not drop out?

    – What strategies do you use to try to keep clients engaged?

        o Have you found these strategies to be successful?

What have you heard from clients about the meals they receive as part of the pilot?

    – What do the clients like about the meals?

    – What do the clients dislike about the meals?

Coordination and collaboration with external providers

To what extent do you communicate and collaborate with the clients' external providers, such as physicians, nurses, or care managers?

    – What is your experience of trying to coordinate with external providers?

    – How easy or difficult has that been? Why?

If a client appears to be at risk of a readmission or experiencing concerning medical challenges, what do you do?

    – Who do you contact and how?

    – How frequently has this come up?

What kinds of challenges do clients commonly face that prevent them from fully participating in the Medi-Cal pilot?

When a client appears to be experiencing challenges preventing him or her from participating in the Medi-Cal pilot program, what kinds of referral services or supports do you provide?

– About how frequently have you needed to do this?

Meal preparation

How do you work with the food preparation team to make sure the meals meet the needs of the individual clients and the pilot program as a whole?

How do you collaborate with the kitchen staff or external meal preparers to ensure meals adhere to nutrition guidelines?

How do you make sure meals are tailored for people with comorbid conditions?

Under what circumstances do you adjust meals to meet the non-nutrition related preferences of clients, such as favorite foods or cultural guidelines?

What aspects of the meal preparation have been going well?

– What factors have contributed to these successes?

What aspects of the meal preparation have been challenging?

– What strategies seem to be effective for addressing these challenges?

Lessons learned

What aspects or features of the Medi-Cal pilot have been critical to its successes?

- How so?

How effective do you think the Medi-Cal pilot has been at helping clients reach their health goals?

- Can you provide an example?

What would you say is the most important lesson you have learned from your experience as a dietitian with the Medi-Cal pilot so far?

What advice would you give to others working on a similar type of program?

Wrap-up

Is there anything else that you think we should know about the Medi-Cal pilot program that you did not have a chance to share with us?

Thank you for your time.

Discussion Guide Meal Delivery Personnel

Respondent and organizational background

How long have you worked or volunteered for [agency] name?

We understand you deliver meals. Can you give us a quick overview of your responsibilities related to the Medi-Cal pilot program?

Overview of the meal delivery process

Can you walk me through a typical food delivery run?

– What's the process for planning and scheduling the deliveries?

– How, if at all, does the process for delivering meals for the Medi-Cal pilot differ from the process for other people that [agency] serves?

– How many times a week do you deliver food to each client? Does it vary among clients? If so, how so?

– Where do you pick up the food?

– What do you do when you get to the client's house? Does it vary among clients? If so, how so?

– How do you interact with clients when dropping off meals? Do you chat? If so, about what?

– When conducting wellness checks, what, if anything, do you look for at client houses? What information do you collect during the meal delivery?

  o Potential probes:

    o How often have you encountered situations such as changes of address, changes of medical condition, self-neglect, and abuse?

    o Can you give me an example?

    o How do you report these concerns?

Perceptions of client satisfaction

What feedback have clients shared with you about the Medi-Cal pilot?

– What have you heard from clients about the meals (packaging and storage, quality and taste, portion size, and so on)?

  o What do the clients like about the meals?

  o What do the clients dislike about the meals?

– What feedback have you heard from clients about the delivery schedule or meal delivery process?

  o What do the clients like about the delivery schedule or process?

  o What do the clients dislike about the meal delivery schedule or process?

– What other types of feedback have clients shared with you?

Overall challenges and successes

What are some challenges you've experienced in delivering meals to clients? Can you give me an example?

- How common are these challenges?

- Are there any patterns in the types of clients with which you face these challenges?

- What have you or your agency done to address these challenges?

Which aspects of the meal deliveries, if any, have gone particularly well? Why?

Lessons learned

What would you say is the most important lesson you have learned from your experience with meal deliveries for the Medi-Cal pilot so far?

What advice would you give to others working on a similar type of program?

Wrap-up

Is there anything else that you think we should know about the Medi-Cal pilot that you did not have a chance to share with us?

Thank you for your time.

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Appendix B:
Beneficiary Focus Group and Interview Protocols

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Focus Group Introduction (all respondents)

Thank you very much for coming to this discussion today. My name is [NAME], and this is [NAME], who will be taking notes. We work for Mathematica, a firm that studies health care and community projects like this one.

As you likely know, our discussion today is part of a study we are conducting for Medi-Cal, California's Medicaid program, to understand how the Medically Tailored Meals program is working. Medi-Cal will use this information to learn how to improve programs like this in the future.

There are no right or wrong answers to our questions; we only wish to hear your honest opinions. The information you share with us is confidential, and your name will not be listed in any information we share with Medi-Cal.

If it's OK with you, we'd like to record this discussion so that we can make sure we have a back-up for our notes. We won't share the recording with anyone outside of our Mathematica study team, and, at the end of our study, we will erase it. Are you OK with us recording?

Now for the ground rules of the discussion:

First, we want your input on a number of topics during the time we have together. At times, I might need to move the conversation along to be sure we cover everything, so don't be offended if I stop some discussions short and move on to other questions.

Next, we want this to be a conversation between everyone in the group. Anyone can reply to my questions or to someone else's comments. We want everyone to feel comfortable talking. Everyone's opinions are important, so please speak up. Most importantly, please be respectful of each other.

We won't be taking any official breaks during this 90-minute discussion. If you need to go to take a short break, please do so.

It would be helpful if everyone could silence their cell phones before we begin.

[If any of the clients have not returned a signed consent form: read all of the elements of consent in the consent form and ask for a verbal confirmation of consent for each element].

Does anyone have any questions before we get started with introductions?

[START THE RECORDERS]

Before we jump in, let's go around the room and have everyone state their first name.

[Thank the participants and start the discussion]

Discussion Guide for Current Participants and Those Who Completed the Program

Warm-up questions

Many of you might already know this, but just to make sure we're all on the same page, we will be asking questions about the Medically Tailored Meals program. This is the program through which you previously received or currently receive the meals that are delivered to your door, together with the medical nutrition therapy sessions with your dietitian. Is everyone familiar with the Medically Tailored Meals program?

We'll call this program the "MTM program" or "the program" as we continue our discussion today.

[For clients who have not completed the program yet] How many of you have been in the program for more than a month? For more than two months?

How did you first hear about the MTM program?

– Who told you about it?

– How was it described to you?

Why did you decide to enroll? What did you hope to gain?

Experiences with administration and enrollment

What was your experience like when you enrolled? How easy or difficult was it to sign up for the program? What would have made enrolling easier?

Tell me about your experience communicating and coordinating with the staff handling enrollment into the program.

– Probes: Are or were you able to reach them when necessary?

– How easy to work with were the employees or volunteers?

Did you have any concerns or hesitations about joining the program? Were these concerns or questions addressed?

Experience and satisfaction with meals

Now let's talk about the meals you are receiving or have received. What are or were the meals like?

– Potential probes:

  o For the most part, were the meals of high quality? Could you provide examples?

  o For the most part, was the food you received fresh? Could you provide examples?

How well do or did the meals meet your personal needs and preferences?

– Potential probes:

  o To what extent do or did you enjoy the meals?

  o What do or did you like? Why?

  o What don't or didn't you like? Why?

- o Do or did any of the meals you received stand out as a favorite? Why?
- o Is or was there enough variety among the foods delivered? How so?
- o For the most part, is or was there enough food to eat? Are or were you full after finishing a meal? Was there too much?
- o What kind of food preparation is or was required for the meals? For the most part, is or was it easy or difficult to prepare the food?

Overall, how well does or did the food delivered meet your expectations?

- – What suggestions do you have for improving the quality of meals?
- – What suggestions do you have to make it easier to prepare the food?

Experience and satisfaction with delivery of the meals and storage

Let's talk about your experiences with the meal deliveries.

How often are or were meals delivered to you? Are or were you happy with the frequency, or would you want the meals delivered more or less often? Why?

- – Are or were meal deliveries scheduled in advance? Are or were meals delivered on the days and times that are convenient for you?

What are or were your interactions with the delivery staff like?

- – What do or did you talk about? Did you ever talk about your health or how things are going for you overall?
- – Do or did you enjoy interacting with the delivery staff?
- – How long do or did your interactions with the delivery staff last?
- – What kind of help do or did you get with carrying and putting away the food that's delivered to you?

Have you had or did you have any issues or problems with delivery staff? Explain.

What are some changes that would improve your experience with the delivery of the meals?

Now let's talk about how you store the meals.

How easy or difficult is or was it for you to store the meals you receive? Why?

- – What, if any, issues have you encountered or did you encounter with storing the meals?
- – What would make it easier or would have made it easier for you to store the meals?

Experiences and satisfaction with dietitians and medical nutrition therapy sessions

Now let's talk about your experiences of working with your dietitians and the medical nutrition sessions.

What has your experience of working with your dietitian been like?

- – How often do or did you meet with your dietitian? Was it too little or too much? Why?
- – Do or did you tend to meet in person or over the phone? Would you have preferred to meet another way? If so, why?

- How long do or did your sessions last? Were the sessions too short or too long? Why?

- How easy or difficult is or was it to talk with your dietitian about your health and your diet?

  o Do or did you feel like you can talk to your dietitian about challenges related to your health or your diet? Why or why not? Give examples.

  o Do or did you feel like your questions about your health and diet were answered? Why or why not? Give examples.

What do you or did you like most about working with your dietitian? What, if anything, made it easy for you to work with your dietitian?

What do you or did you like least about working with your dietitian? What, if any, challenges did you experience in working with your dietitian? What would have made it better?

Overall, how useful were the sessions with the dietitian? That is, to what extent do or did you feel that the sessions with your dietitian and the educational materials you received are preparing or prepared you to purchase and prepare healthy meals after the program ends?

- What is the most important thing that you learned from working the dietitian?

- What kinds of educational materials have they been providing or did they provide you? Do or did you use the materials? Do or did you feel like these materials are helpful?

- What other information or resources do you need to feel prepared to purchase, prepare, and eat healthy meals?

- Are there topics you'd like to learn about that haven't been addressed so far or, for those of you who completed the program, were never addressed?

Overall, did working with the dietitian meet your expectations? That is, did you get what you wanted from the dietitians and the sessions?

- Is there anything you would like or have liked the dietitian to do differently in your sessions?

- What would make or have made your experience of working with the dietitian better?

Wrap-up

We would now like to turn to some wrap-up questions.

If you could change one thing about the program to improve it for people who will use it in the future, what would it be and why?

To finish up our conversation, is there anything about the program that you want to tell me about that we didn't already talk about?

Discussion Guide for Those Who Started the Program but Dropped Out

Warm-up questions

Many of you might already know this, but just to make sure we are all on the same page, we will be asking questions about the Medically Tailored Meals program. This is the program through which you previously received the meals that were delivered to your door, together with the medical nutrition therapy sessions with your dietitian. Is everyone familiar with the Medically Tailored Meals program?

We will call this program the "MTM program" or "the program" as we continue our discussion today.

To start, we understand that you were participating in the program but were not able to continue with it. We would like to understand what made it difficult for you to continue participating in the program.

What did you not like about the program?

What aspects of the program were challenging for you?

What were the factors in your decision not to continue with the program?

What, if anything, do you think the program could do better?

What would have helped you to complete the program?

Experiences with administration and enrollment

How did you first hear about the MTM program?

– Who told you about it?

– How was it described to you?

Why did you decide to enroll? What did you hope to gain?

What was your experience like with enrolling? How easy or difficult was it to sign up for the program? What would have made enrolling easier?

Tell me about your experience communicating and coordinating with the staff handling enrollment into the program?

– Probes: Are or were you able to reach them when necessary?

– How easy to work with were the employees or volunteers?

Did you have any concerns or hesitations about joining the program? Were these concerns or questions addressed?

Experience and satisfaction with meals

Now let's talk about the meals you received. What were the meals like?

– Potential probes:

o For the most part, were the meals of high quality? Could you provide examples?

o For the most part, was the food you received fresh? Could you provide examples?

How well did the meals meet your personal needs and preferences?

– Potential probes:

  o To what extent did you enjoy the meals?

  o What did you like? Why?

  o What didn't you like? Why?

  o Did any of the meals you received stand out as a favorite?

  o Is or was there enough variety among the foods delivered? How so?

  o Did you ever feel like there was not enough or too much food to eat? Were you full after finishing a meal?

  o What kind of food preparation was required for the meals? How easy or difficulty was it to prepare the food?

Overall, how well does or did the food delivered meet your expectations?

– What suggestions do you have for improving the quality of meals?

– What suggestions do you have to make it easier to prepare the food?

Experience and satisfaction with delivery of the meals and storage

Let's talk about your experiences with the meal deliveries.

How often were meals delivered to you? Were you happy with the frequency, or would you have wanted the meals delivered more or less often? Why?

– Were meal deliveries scheduled in advance? Were meals delivered on the days and times that were convenient for you?

What were your interactions with the delivery staff like?

– What did you talk about?

– Did you enjoy interacting with the delivery staff?

– How long did your interactions with the delivery staff last?

– What kind of help did you get with carrying and putting away the food that was delivered to you?

Did you have any issues or problems with delivery staff? Explain.

What are some changes that would improve the delivery of the meals?

Now let's talk about how you stored the meals.

How easy or difficult was it for you to store the meals you receive? Why?

– What, if any, issues did you encounter with storing the meals?

– What would have made it easier for you to store the meals?

Experiences and satisfaction with dietitians and medical nutrition therapy sessions

Now let's talk about your experiences of working with your dietitians and your medical nutrition sessions.

What was your experience of working with your dietitian like?

–   How often did you meet with your dietitian? Was it too little or too much? Why?

–   Do or did you tend to meet in person or over the phone? Would you have preferred to meet another way? If so, why?

–   How long did your sessions last? Were the sessions too short or too long? Why?

–   How easy or difficult was it to talk with your dietitian about your health and your diet?

   o   Did you feel like you can talk to your dietitian about challenges related to your health or your diet? Why or why not? Give examples.

   o   Did you feel like your questions about your health and diet got answered? Why or why not? Give examples.

What do you or did you like most about working with your dietitian? What, if anything, made it easy for you to work with your dietitian?

What do or did you like least about working with your dietitian? What challenges, if any, did you experience in working with your dietitian? What would have made it better?

Overall, how useful were the sessions with the dietitian? That is, to what extent did you feel that the sessions with your dietitian and the educational materials you received prepared you to purchase and prepare healthy meals after your left the program?

–   What is the most important thing that you learned from working the dietitian?

–   What kinds of educational materials did they provide you? Did you use the materials? Did you feel like these materials were helpful?

–   What other information or resources do you need to feel prepared to purchase, prepare, and eat healthy meals?

–   Are there topics you'd like to learn about that were not addressed when you were in the program?

Overall, did working with the dietitian meet your expectations? That is, did you get what you wanted from the dietitians and the sessions?

–   Is there anything you would have liked the dietitian to do differently in your sessions?

–   What would have made your experience of working with the dietitian better?

Wrap-up

We would now like to turn to some wrap up questions.

If you could change one thing about the program to improve it for people who will use it in the future, what would it be and why?

To finish up our conversation, is there anything about the program that you want to tell me about that we didn't already talk about?

Interview introduction (all respondents)

Thank you very much for coming to this discussion today. My name is [NAME], and this is [NAME], who will be taking notes. We work for Mathematica, a firm that studies health care and community projects like this one.

As you likely know, our discussion today is part of a study we are conducting for Medi-Cal, California's Medicaid program, to understand how the Medically Tailored Meals program is working. Medi-Cal will use this information to learn how to improve programs like this in the future.

There are no right or wrong answers to our questions; we only wish to hear your honest opinions. The information you share with us is confidential, and your name will not be listed in any information we share with Medi-Cal.

If it's OK with you, we'd like to record this discussion so that we can make sure we have a back-up for our notes. We won't share the recording with anyone outside of our Mathematica study team, and, at the end of our study, we will erase it. Are you OK with us recording?

We want your input on a number of topics during the time we have together. At times, I might need to move the conversation along to be sure we cover everything, so don't be offended if I stop some discussions short and move on to other questions.

[If client has not returned a signed consent form: read all of the elements of consent in the consent form and ask for a verbal confirmation of consent for each element].

Does you have any questions before we get started with the interview?

[START THE RECORDER]

Discussion Guide for Current Participants and Those Who Completed the Program

Warm-up questions

You might already know this, but just to make sure we're all on the same page, we will be asking questions about the Medically Tailored Meals program. This is the program through which you previously received or currently receive the meals that are delivered to your door, together with the medical nutrition therapy sessions with your dietitian. Are you familiar with the Medically Tailored Meals program?

We'll call this program the "MTM program" or "the program" as we continue our discussion today.

[For clients who have not completed the program yet] How long have you been in the MTM program?

How did you first hear about the MTM program?

– Who told you about it?

– How was it described to you?

Why did you decide to enroll? What did you hope to gain?

Experiences with administration and enrollment

What was your experience like when you enrolled? How easy or difficult was it to sign up for the program? What would have made enrolling easier?

Tell me about your experience communicating and coordinating with the staff handling enrollment into the program.

– Probes: Are or were you able to reach them when necessary?

– How easy to work with were the employees or volunteers?

Did you have any concerns or hesitations about joining the program? Were these concerns or questions addressed?

Experience and satisfaction with meals

Now let's talk about the meals you are receiving or have received. What are or were the meals like?

– Potential probes:

o For the most part, were the meals of high quality? Could you provide examples?

o For the most part, was the food you received fresh? Could you provide examples?

How well do or did the meals meet your personal needs and preferences?

– Potential probes:

o To what extent do or did you enjoy the meals?

o What do or did you like? Why?

o What don't or didn't you like? Why?

- o Do or did any of the meals you received stand out as a favorite? Why?
- o Is or was there enough variety among the foods delivered? How so?
- o For the most part, is or was there enough food to eat? Are or were you full after finishing a meal? Was there too much?
- o What kind of food preparation is or was required for the meals? For the most part, is or was it easy or difficult to prepare the food?

Overall, how well does or did the food delivered meet your expectations?

- – What suggestions do you have for improving the quality of meals?
- – What suggestions do you have to make it easier to prepare the food?

Experience and satisfaction with delivery of the meals and storage

Let's talk about your experiences with the meal deliveries.

How often are or were meals delivered to you? Are or were you happy with the frequency, or would you want the meals delivered more or less often? Why?

- – Are or were meal deliveries scheduled in advance? Are or were meals delivered on the days and times that are convenient for you?

What are or were your interactions with the delivery staff like?

- – What do or did you talk about? Did you ever talk about your health or how things are going for you overall?
- – Do or did you enjoy interacting with the delivery staff?
- – How long do or did your interactions with the delivery staff last?
- – What kind of help do or did you get with carrying and putting away the food that's delivered to you?

Have you had or did you have any issues or problems with delivery staff? Explain.

What are some changes that would improve your experience with the delivery of the meals?

Now let's talk about how you store the meals.

How easy or difficult is or was it for you to store the meals you receive? Why?

- – What, if any, issues have you encountered or did you encounter with storing the meals?
- – What would make it easier or would have made it easier for you to store the meals?

Experiences and satisfaction with dietitians and medical nutrition therapy sessions

Now let's talk about your experiences of working with your dietitians and the medical nutrition sessions.

What has your experience of working with your dietitian been like?

- – How often do or did you meet with your dietitian? Was it too little or too much? Why?
- – Do or did you tend to meet in person or over the phone? Would you have preferred to meet another way? If so, why?

  – How long do or did your sessions last? Were the sessions too short or too long? Why?

  – How easy or difficult is or was it to talk with your dietitian about your health and your diet?

  o Do or did you feel like you can talk to your dietitian about challenges related to your health or your diet? Why or why not? Give examples.

  o Do or did you feel like your questions about your health and diet were answered? Why or why not? Give examples.

What do you or did you like most about working with your dietitian? What, if anything, made it easy for you to work with your dietitian?

What do you or did you like least about working with your dietitian? What, if any, challenges did you experience in working with your dietitian? What would have made it better?

Overall, how useful were the sessions with the dietitian? That is, to what extent do or did you feel that the sessions with your dietitian and the educational materials you received are preparing or prepared you to purchase and prepare healthy meals after the program ends?

  – What is the most important thing that you learned from working the dietitian?

  – What kinds of educational materials have they been providing or did they provide you? Do or did you use the materials? Do or did you feel like these materials are helpful?

  – What other information or resources do you need to feel prepared to purchase, prepare, and eat healthy meals?

  – Are there topics you'd like to learn about that haven't been addressed so far or, for those of you who completed the program, were never addressed?

Overall, did working with the dietitian meet your expectations? That is, did you get what you wanted from the dietitians and the sessions?

  – Is there anything you would like or have liked the dietitian to do differently in your sessions?

  – What would make or have made your experience of working with the dietitian better?

Wrap-up

We would now like to turn to some wrap-up questions.

If you could change one thing about the program to improve it for people who will use it in the future, what would it be and why?

To finish up our conversation, is there anything about the program that you want to tell me about that we didn't already talk about?

Discussion Guide for Those Who Started the Program but Dropped Out

Warm-up questions

You might already know this, but just to make sure we are all on the same page, we will be asking questions about the Medically Tailored Meals program. This is the program through which you previously received the meals that were delivered to your door, together with the medical nutrition therapy sessions with your dietitian. Are you familiar with the Medically Tailored Meals program?

We will call this program the "MTM program" or "the program" as we continue our discussion today.

To start, we understand that you were participating in the program but were not able to continue with it. We would like to understand what made it difficult for you to continue participating in the program.

What did you not like about the program?

What aspects of the program were challenging for you?

What were the factors in your decision not to continue with the program?

What, if anything, do you think the program could do better?

What would have helped you to complete the program?

Experiences with administration and enrollment

How did you first hear about the MTM program?

- – Who told you about it?
- – How was it described to you?

Why did you decide to enroll? What did you hope to gain?

What was your experience like with enrolling? How easy or difficult was it to sign up for the program? What would have made enrolling easier?

Tell me about your experience communicating and coordinating with the staff handling enrollment into the program?

- – Probes: Are or were you able to reach them when necessary?
- – How easy to work with were the employees or volunteers?

Did you have any concerns or hesitations about joining the program? Were these concerns or questions addressed?

Experience and satisfaction with meals

Now let's talk about the meals you received. What were the meals like?

- – Potential probes:
    - o For the most part, were the meals of high quality? Could you provide examples?
    - o For the most part, was the food you received fresh? Could you provide examples?

How well did the meals meet your personal needs and preferences?

– Potential probes:

  o To what extent did you enjoy the meals?

  o What did you like? Why?

  o What didn't you like? Why?

  o Did any of the meals you received stand out as a favorite?

  o Is or was there enough variety among the foods delivered? How so?

  o Did you ever feel like there was not enough or too much food to eat? Were you full after finishing a meal?

  o What kind of food preparation was required for the meals? How easy or difficulty was it to prepare the food?

Overall, how well does or did the food delivered meet your expectations?

– What suggestions do you have for improving the quality of meals?

– What suggestions do you have to make it easier to prepare the food?

Experience and satisfaction with delivery of the meals and storage

Let's talk about your experiences with the meal deliveries.

How often were meals delivered to you? Were you happy with the frequency, or would you have wanted the meals delivered more or less often? Why?

– Were meal deliveries scheduled in advance? Were meals delivered on the days and times that were convenient for you?

What were your interactions with the delivery staff like?

– What did you talk about?

– Did you enjoy interacting with the delivery staff?

– How long did your interactions with the delivery staff last?

– What kind of help did you get with carrying and putting away the food that was delivered to you?

Did you have any issues or problems with delivery staff? Explain.

What are some changes that would improve the delivery of the meals?

Now let's talk about how you stored the meals.

How easy or difficult was it for you to store the meals you receive? Why?

– What, if any, issues did you encounter with storing the meals?

– What would have made it easier for you to store the meals?

Experiences and satisfaction with dietitians and medical nutrition therapy sessions

Now let's talk about your experiences of working with your dietitians and your medical nutrition sessions.

What was your experience of working with your dietitian like?

- How often did you meet with your dietitian? Was it too little or too much? Why?
- Do or did you tend to meet in person or over the phone? Would you have preferred to meet another way? If so, why?
- How long did your sessions last? Were the sessions too short or too long? Why?
- How easy or difficult was it to talk with your dietitian about your health and your diet?
    o Did you feel like you can talk to your dietitian about challenges related to your health or your diet? Why or why not? Give examples.
    o Did you feel like your questions about your health and diet got answered? Why or why not? Give examples.

What do you or did you like most about working with your dietitian? What, if anything, made it easy for you to work with your dietitian?

What do or did you like least about working with your dietitian? What challenges, if any, did you experience in working with your dietitian? What would have made it better?

Overall, how useful were the sessions with the dietitian? That is, to what extent did you feel that the sessions with your dietitian and the educational materials you received prepared you to purchase and prepare healthy meals after your left the program?

- What is the most important thing that you learned from working the dietitian?
- What kinds of educational materials did they provide you? Did you use the materials? Did you feel like these materials were helpful?
- What other information or resources do you need to feel prepared to purchase, prepare, and eat healthy meals?
- Are there topics you'd like to learn about that were not addressed when you were in the program?

Overall, did working with the dietitian meet your expectations? That is, did you get what you wanted from the dietitians and the sessions?

- Is there anything you would have liked the dietitian to do differently in your sessions?
- What would have made your experience of working with the dietitian better?

Wrap-up

We would now like to turn to some wrap up questions.

If you could change one thing about the program to improve it for people who will use it in the future, what would it be and why?

- To finish up our conversation, is there anything about the program that you want to tell me about that we didn't already talk about?

Appendix C:
Impact Evaluation Methods

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A. Study inclusion criteria

Mathematica set six inclusion criteria for identifying treatment and potential comparison beneficiaries that emulated, as closely as possible, the eligibility criteria for the MTM pilot program. Treatment beneficiaries that could not confirm these eligibility criteria in the available data were not included in the study, even though they might indeed have been eligible for the MTM pilot program. For example, qualifying utilization by dually eligible beneficiaries was not able to be observed because only Medi-Cal claims data was used without the use of Medicare claims. The six inclusion criteria were the following:

1. Beneficiary was full scope Medi-Cal
2. Beneficiary had no cost-sharing
3. Beneficiary had at least 12 months consecutive Medi-Cal coverage (excluding dental-only coverage) at baseline
4. Beneficiary had at least one recorded congestive heart failure diagnosis on a Medi-Cal claim in the prior 24 months. This included all ICD-10 diagnosis codes I50.x in primary or subsequent diagnosis fields.
5. Beneficiary had at least one emergency department visit, inpatient stay, or skilled nursing facility stay in the prior 24 months. See below for definitions.
6. Beneficiary had at least one visit with a physician in the prior 12 months. See below for the definition of a physician visit.

B. Variable definitions

1. Outcome variables

All outcome variables were constructed at the beneficiary-quarter level in main regression analyses. For quarters where the beneficiary was only partially observed, counts were extrapolated to the full quarter (91 days). For example, if a beneficiary was observed for 50 percent of the days in a quarter and had one emergency department visit in that time period, the prorated count of emergency department visits for that beneficiary was two visits for the quarter.[20] Evaluators also created binary versions of each outcome variable: 1 indicated that the beneficiary used any type of medical service and 0 meant the beneficiary had no utilization of a given type. Evaluators used the binary outcomes in robustness checks.

a. *Emergency department visits*

The definition of emergency department visits included emergency room visits that did and did not lead to hospitalization as well as observation stays. Evaluators used claims and managed care encounter data to identify emergency room visits based on revenue center codes (0450 through 0459 or 0981) related to the emergency room as well as a Medi-Cal-specific procedure code (Z7502). To rule out cases where beneficiaries had an outpatient visit in one part of the hospital, but where laboratory or imaging work was performed in the emergency room, evaluators excluded claims and encounter records that contained only procedure codes for

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[20] In the final report, evaluators plan to conduct a robustness check in which utilization is not prorated, analyzing only utilization for which there were claims.

laboratory tests and imaging (70000 through 89999) but did not include an evaluation, management, or other procedure codes. Evaluators captured observation stays with revenue center codes (0760 or 0762) and a single procedure code (G0378) and created an outcome variable that captured emergency room visits or observation stays where the primary diagnosis code was for congestive heart failure (I50.x) on any claim or encounter record related to that visit.

b.   *Ambulance transports*

The definition of ambulance transport used only included those transports from a residence or scene of an accident to the hospital and excluded interhospital transfers. Evaluators used procedure codes (A0425 through A0436) and modifier codes ("EH," "RH," or "SH"), and only counted one ambulance transport per day to avoid counting multiple legs of the same transport.

c.   *Inpatient stays*

Evaluators used type of bill codes for inpatient hospital services (those starting with 011, 012, or 085) and revenue center codes to identify room and board, except those indicating psychiatric, hospice, or rehabilitation services (0100–0219, excluding 0114, 0115, 0118, 0124, 0125, 0128, 0134, 0135, 0138, 0144, 0145, 0148, 0154, 0155, 0158, 0185, 0190–0199, and 0204). Overlapping and adjacent inpatient claims were combined into continuous inpatient stays, and days were counted using the admission and discharge date for the combined stay. Evaluators also created an outcome variable that captured inpatient stays where the primary diagnosis code was for congestive heart failure (I50.x) on any claim or encounter record related to that stay. Evaluators identified inpatient stays with intensive care unit or coronary care unit services using revenue center codes (0200–0204, 0207–0214).

d.   *Skilled nursing facility stays*

Mathematica used type of bill codes for skilled nursing facility services (those starting with 021, 022, 018, or 028) and revenue center codes to identify room and board, except those indicating psychiatric, hospice, or rehabilitation services (0100–0219, excluding 0114, 0115, 0118, 0124, 0125, 0128, 0134, 0135, 0138, 0144, 0145, 0148, 0154, 0155, 0158, 0185, 0190–0199, and 0204). Evaluators also identified skilled nursing facility claims using a revenue center code for prospective skilled nursing facility payment (0022). Evaluators combined overlapping and adjacent skilled nursing facility claims into continuous stays and counted days using the admission and discharge date for the combined stay. Evaluators also created an outcome variable that captured skilled nursing facility stays where the primary diagnosis code was for congestive heart failure (I50.x) on any claim or encounter record related to that stay.

e.   *Long-term care hospital stays[21]*

Mathematica used revenue codes 0190–0199 along with billing codes for inpatient hospital services (those starting with 011, 012, or 085) or skilled nursing facility stays (those starting with 021, 022, 018, or 028). Additionally, evaluators identified claims with the type of billing codes for

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[21] This utilization measure was used when creating matching groups but was not an outcome measure for the interim report.

intermediate care beds (015, 016, 065, 066) along with any room and board revenue center code (0100–0219).

f. Prescription drugs

To construct the medication adherence measures, Mathematica consulted with physician researchers to develop a list of National Drug Code (NDC) codes from drug classes that are commonly used for treating congestive heart failure, including diuretics, angiotensin converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARB), angiotensin receptor-neprilysin inhibitors, beta-blockers, hydralazine with nitrate, ivabradine, and mineraloid antagonists. Digoxin was included which is commonly used to treat heart failure but is not indicated for acute exacerbations of heart failure. The drugs in this list of classes include but are not limited to drugs identified in the clinical guidelines developed by the American College of Cardiology, American Heart Association, and Heart Failure Society of America (Yancy et al., 2017) for treating congestive heart failure. Evaluators identified the NDC codes for drugs in these classes using the product file of the Food and Drug Administration NDC database file downloaded on June 11, 2020 (National Drug Code Database, 2020).

g. Outpatient visits

Outpatient visits were identified using place of service codes (2, 4, 5, or 7), as well as procedure codes indicating evaluation and management (99201–99499, G0438, G0439, and G0463). The measure of outpatient office visits (used to determine eligibility) used only the evaluation and management codes above and not any other place of service codes. Primary care visits were identified using primary care provider specialty codes or taxonomy codes. Specialists were identified as those visits that were not to primary care providers. In cases where provider specialty code and taxonomy code were both missing, an outpatient visit could not be classified as primary care or specialty care.

2. Covariates

a. Demographics

Mathematica used the Medi-Cal enrollment files to determine age in years, gender, and race/ethnicity. Age was fixed at meal start date (or pseudo start date for comparison beneficiaries) and reported gender and race/ethnicity were allowed to vary from quarter to quarter.

b. Medi-Cal enrollment characteristics

Evaluators used the Medi-Cal enrollment files to determine dual status, participation in fee-for-service Medi-Cal, and participation in the coordinated care initiative (CCI) program. All variables were allowed to vary from quarter to quarter.

c. ZIP code characteristics

Evaluators used the American Community Survey to determine ZIP code level characteristics as of 2018, including the following ZIP code level variables: median income, fraction in poverty,

fraction with at least a high school degree, fraction with at least a college degree, fraction unemployed, fraction White, fraction Black, and fraction Latinx.

d. County-level COVID-19 cases and hospitalizations per capita

Evaluators used monthly data on recorded COVID-19 cases and hospitalizations,[22] along with county population counts from the U.S. Census to construct per capita counts of COVID-19 cases and the average daily count of patients hospitalized for each county. Monthly data were combined to construct quarterly measures for each beneficiary.

e. Diagnosis flags

Based on guidance from DHCS, Mathematica used all ICD-10 diagnosis codes starting with I50.x to identify patients with congestive heart failure. Evaluators used a 24-month look-back period. To account for congestive heart failure severity, evaluators created separate flags for systolic (I50.2), diastolic (I50.3), or combined systolic and diastolic congestive heart failure (I50.4). Other codes were used to identify left ventricular failure (I50.1), other heart failure such as right heart failure (I50.8), or unspecified heart failure (I50.9). Evaluators also created diagnosis flags to distinguish between (1) acute and acute-on-chronic congestive heart failure (I50.21, I50.23, I50.31, I50.33, I50.41, or I50.43) versus (2) chronic and unspecified congestive heart failure (I50.1, I50.20, I50.22, I50.30, I50.32, I50.40, or I50.42).

A physician researcher at Mathematica reviewed literature to identify other clinical and social characteristics relevant to congestive heart failure to use in the matching model. These conditions fall into three main categories: (1) conditions related to congestive heart failure, (2) conditions that are sensitive to diet, and (3) behavioral health conditions.[23] Among the conditions related to congestive heart failure, coronary artery disease, hypertension, and valvular disease are risk factors for congestive heart failure, whereas atrial fibrillation and cardiac arrhythmia are exacerbated by congestive heart failure. Evaluators also considered diet-sensitive conditions, such as diabetes, obesity, kidney disease, and cancer, which may have an effect on clients' nutritional needs. Evaluators captured behavioral health conditions such as depression, which has been used in other studies of MTMs (Palar et al., 2017). **Table C.1** describes each of the conditions, along with the ICD-10 codes, used to identify participants with these conditions.

Table C.1. Relevant clinical characteristics considered in matching

Description	Definition
Conditions related to congestive heart failure	
Coronary artery disease	ICD-10 dx code = I25.10x
Hypertension	ICD-10 dx code = I10x
Atrial fibrillation	ICD-10 dx code = I48x
Valvular disease	ICD-10 dx code = I08x

[22] COVID-19 case data came from https://usafacts.org/visualizations/coronavirus-covid-19-spread-map/; hospitalization data came from https://data.chhs.ca.gov/dataset/covid-19-hospital-data.
[23] We considered adding food allergies (ICD-10 dx code = T78.0x and T78.1x) and homelessness (Z59), but these codes were rarely populated, so were not included in the analysis.

Description	Definition
Cardiac arrhythmias	ICD-10 dx code = I49x
Diet-related conditions	
Diabetes	ICD-10 dx code = E08-13x, Z79.4
Obesity	ICD-10 dx code = E66x, Z6830-Z6839, Z6841-Z6845
End-stage renal disease (ESRD)	ICD-10 dx code = N18.6x (stage 5: I12.0, I13.11, I13.2, N18.5, N18.6)
Late-stage (3 & 4) chronic kidney disease	ICD-10 dx code = N18.3x or N18.4x
Any cancer (malignant neoplasms)	ICD-10 dx code = C00x – C99x (including C7A and C7B)
Behavioral health	
Behavioral health	ICD-10 dx code in F category (F00x-F99x)
Developmental disability CDPS category flag	ICD-10 dx code = F70x, F71x, or Q90x
Other	
Homelessness and other social needs	ICD-10 dx code = Z59.x
Composite category of diagnoses targeted by MTM expansion	Any of the following: • HIV/AIDS: ICD-10 code = B20 • Chronic Obstructive Pulmonary Disease: ICD-10 dx code =J43.1, J43.2, J43.8, J43.9, J44.0, J44.1, J44.9 • Malnutrition: ICD-10 dx code = E40-E46 or E63.9 • Diabetes (as defined above) • ESRD (as defined above) • Late-stage chronic kidney disease (as defined above) • Any cancer (as defined above)

C. Matching

Mathematica used GroupMatch (Pimentel et al., 2019) to select matched comparison beneficiaries with their associated meal pseudo start dates. GroupMatch is a propensity score matching procedure designed for situations in which the treatment group is enrolled into the model on a rolling basis and there is no corresponding enrollment date for members of the comparison group. The key innovation of GroupMatch is that the model considers many potential pseudo start dates and is able to whittle it down to produce one pseudo start date for each comparison beneficiary. GroupMatch uses an optimal matching algorithm to determine the resulting matched comparison group, including the choice of pseudo start date for each member. To select the best meal pseudo start date for the comparison group, GroupMatch considered each possible month for the meal start date (starting in April 2018) for each possible comparison beneficiary.

Mathematica used calipers and stratification to make sure intervention and comparison beneficiaries match closely (or exactly) on key matching variables. In the main analysis, the county of residence for the beneficiaries had to match exactly. Calipers were also utilized for (1) emergency department visits in the last baseline quarter, (2) inpatient stays in the last baseline quarter, and (3) outpatient office visits to a primary care or specialty provider in the last baseline quarter to ensure that comparison beneficiaries matched the treatment group in terms of baseline utilization trends. Other matching variables are shown in **Table C.2**. **Figure C.1** shows trends in outcome variables in baseline and follow-up periods. The figures show parallel trends in the baseline period and a similar pattern of regression to the mean in the follow-up period.

Table C.2. Variables used in matching process

Matching variables			
Demographic and enrollment characteristics			
Age	Sex	Race/ethnicity	Dually eligible
FFS Medicaid	CCI participation	Consecutive months of enrollment	
Health characteristics			
Type of CHF	Coronary artery disease	Hypertension	Valvular disease
Cardiac arrhythmia	Atrial fibrillation	Diabetes	Obesity
End-stage renal disease	Late-stage kidney disease	Cancer	Behavioral health disorder
CDPS score			
Health care utilization in last baseline quarter			
ED visits (count)	Any ED visits (binary)	Inpatient stays (count)	Any inpatient stays (binary)
Hospitalized on enrollment date	Inpatient days (count)	SNF stays (count)	Any SNF stays (binary)
SNF days (count)	Any ED visit for CHF	Any ambulance transport	Any inpatient stay for CHF
Any inpatient stay with ICU or CCU	Any SNF stay for CHF	Outpatient office visits (count)	Any diuretic prescription
Number of prescriptions filled	Time since last ED visit	Time since last inpatient stay	Time since last SNF stay
Any diuretics use (binary)			
Health care utilization in first three baseline quarters			
ED visits (count)	Inpatient stays (count)	Inpatient days (count)	SNF stays (count)
SNF days (count)	Any ED visit for CHF	Any ambulance transport	Any inpatient stay for CHF
Any inpatient stay with ICU or CCU	Any SNF visit for CHF	Outpatient office visits (count)	Any diuretic prescription
Number of prescriptions filled	Any diuretics use (binary)		
Location characteristics			
County of residence	ZIP code percent in poverty	ZIP code food desert indicator	Rural ZIP code
Monthly county COVID cases, per million, on start date	Monthly county COVID hospitalizations, per million, on start date		
Time characteristics			
Started during the COVID-19 pandemic (on or after March 1, 2020)			

CCI = coordinated care initiative; CCU = cardiac care unit; CDPS = Chronic Illness and Disability Payment System; CHF = chronic heart failure; ED = emergency department; FFS = fee for service; ICU = intensive care unit; SNF = skilled nursing facility.

Figure C.1. Trends in ED visits, inpatient stays, skilled nursing facility stays, congestive heart failure medication adherence, and outpatient visits
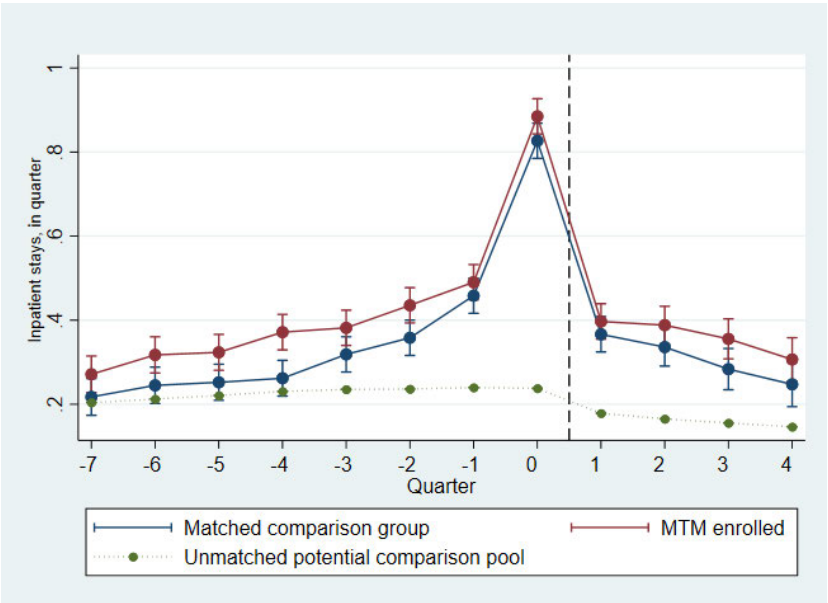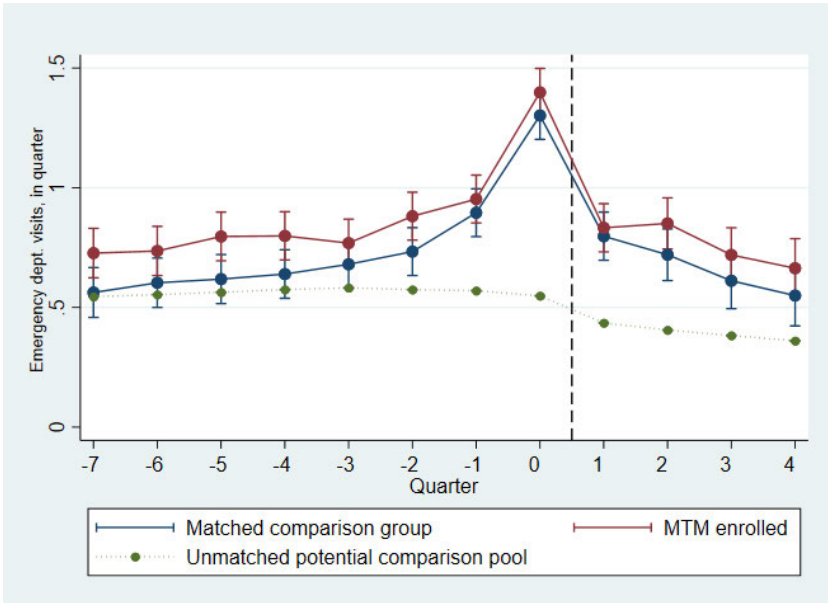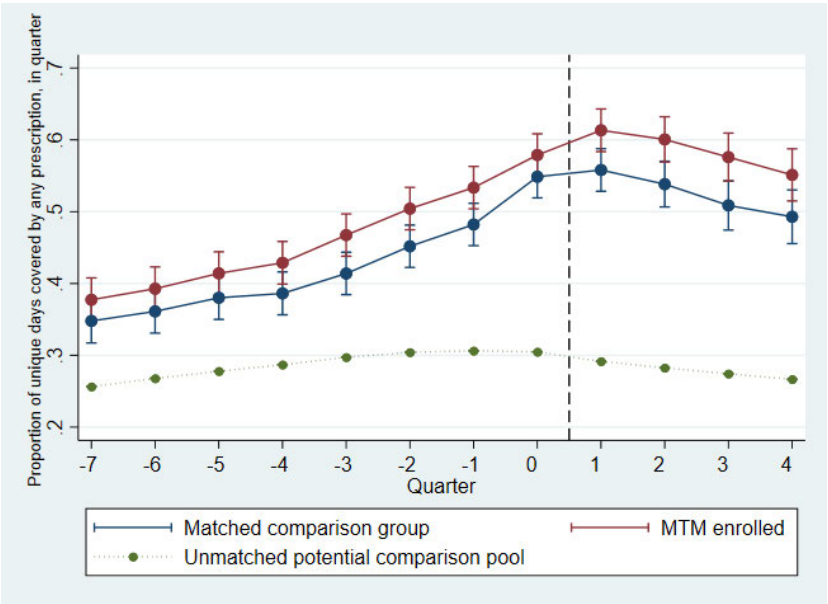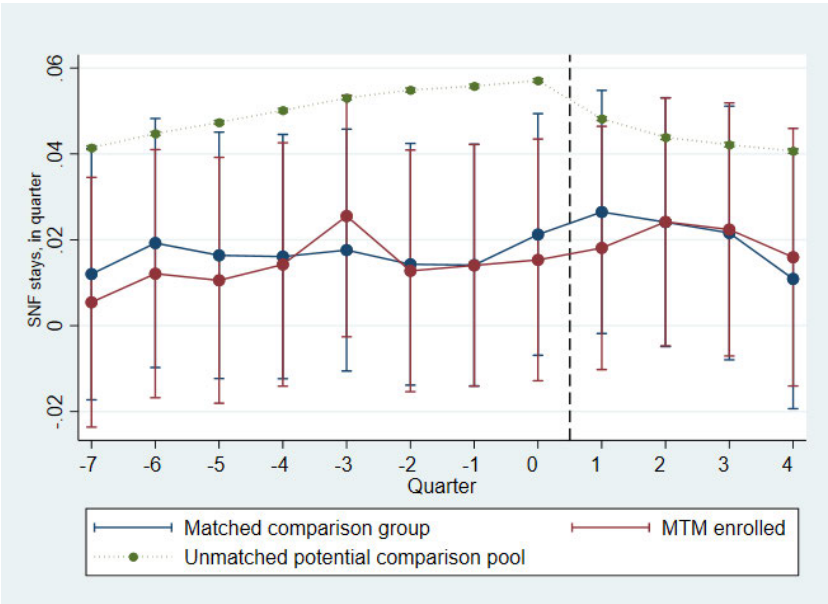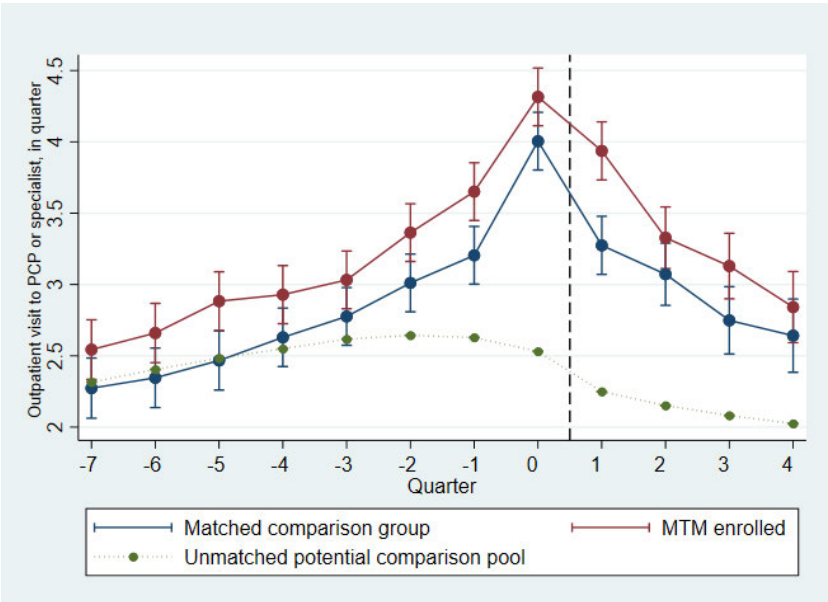
Note: Figures show trends in outcome variables for two years of the baseline period (quarters -7 through 0) and one year of the follow-up period (quarters 1 through 4)

Mathematica used variable ratio matching allowed up to five unique comparison beneficiaries to a single treatment beneficiary, thereby increasing statistical power. The analysis weighted each matched comparison in accordance with the matching ratio. Evaluators did not add restrictions to ensure the treatment and comparison groups matched closely on the calendar month of their meal start date and meal pseudo start date, respectively. This provided the flexibility to match a treatment group beneficiary who enrolled in MTM in June 2018 to a comparison group beneficiary with a meal pseudo start date in March 2019. This flexibility increased the number of comparison beneficiaries available to match to each MTM beneficiary. Evaluators did include covariates that captured COVID-19 cases and hospitalizations in the matching model, as well as an indicator for whether the beneficiary's start date or pseudo start date was in the COVID-19 period (starting March 1, 2020), which ensured that matched comparisons encountered similar phases of the COVID-19 pandemic.

After creating the matched comparison group, evaluators assessed balance using standardized differences between treatment and comparison groups to ensure they were balanced. Evaluators aimed to keep the differences between treatment and comparison beneficiaries to within 0.10 standardized differences, particularly for high-priority matching variables. Evaluators accepted a less restrictive standard of 0.25 standardized differences for lower priority matching variables. A target of 0.25 standardized differences is an industry standard [for example, Institute of Education Sciences (2014)]. **Appendix Figure C.2** shows the mean difference between the enrolled and comparison group for each covariate before (blue) and after matching (red). Matching reduced mean differences between the enrolled and comparison groups.

Figure C.2. Balance plots for key matching variables
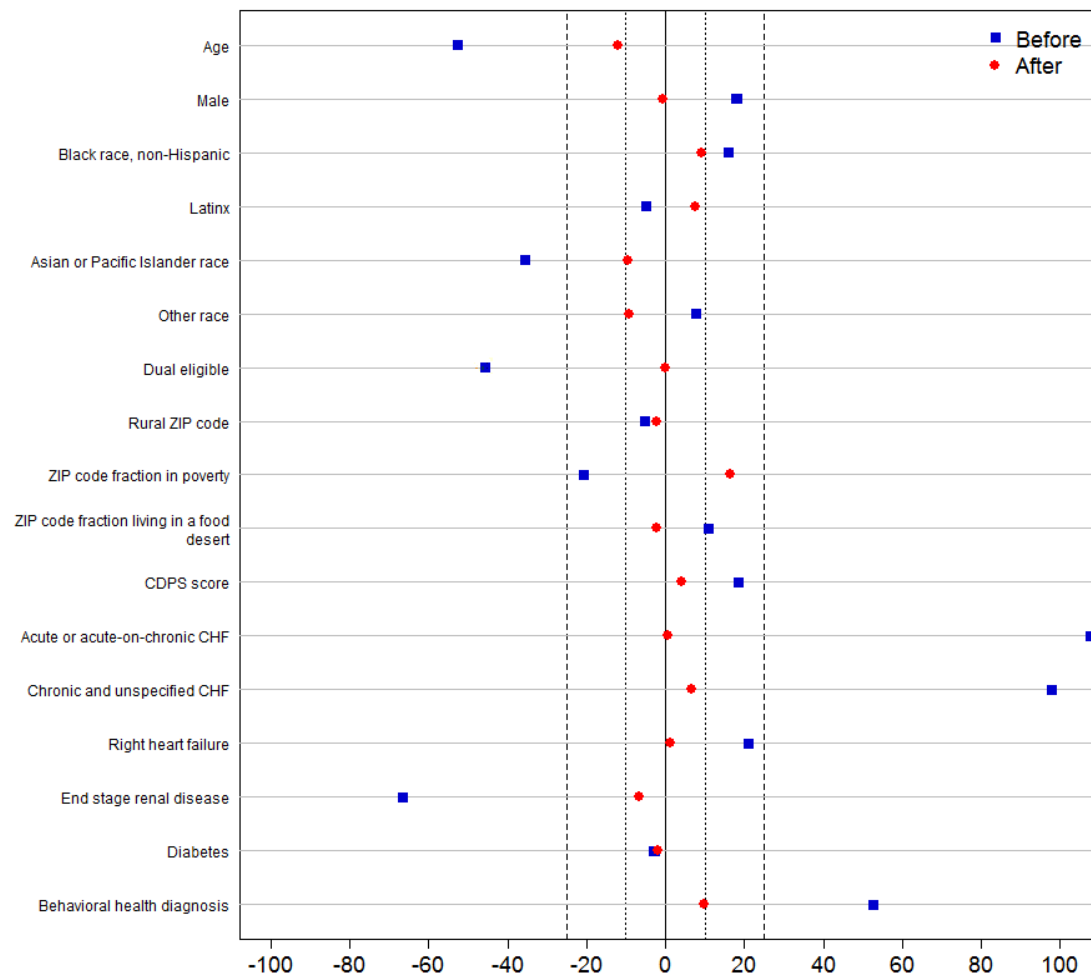
Note: Figure shows balance, reported in standardized differences, between the enrolled population and comparison group before (blue) and after matching (red). Outer dashed vertical lines represent +/- 0.25 standardized differences, and inner dotted vertical lines represent +/- 0.10 standardized differences.

Table C.3. Balance table for all variables

Variable label	Comparison pool mean before matching (N = 2,247,995)	Weighted comparison mean after matching (N = 3,506)	Treatment mean (N = 783)	Treatment – Comparison difference after matching	Standardized difference after matching
Propensity score	0.000	0.004	0.004	0	0.03
Age	66	60	59	-1.5	-0.12
Male	47%	56%	56%	0.0	-0.01
Black race, non-Hispanic	16%	19%	23%	0.0	0.09
Latinx	32%	26%	29%	0.0	0.08
Asian or Pacific Islander race	13%	7%	5%	0.0	-0.10
Other race	14%	21%	17%	0.0	-0.09
Dually eligible	52%	31%	31%	0.0	0.00
Consecutive months enrolled before start date	39	38	39	1.0	0.09
CDPS score	5.9	6.3	6.4	0.1	0.04
Acute or acute-on-chronic congestive heart failure	23%	71%	71%	0.0	0.01
Chronic and unspecified congestive heart failure	38%	76%	78%	0.0	0.07
Right heart failure	1%	6%	6%	0.0	0.01
End-stage renal disease	13%	4%	2%	0.0	-0.07
Behavioral health diagnosis	51%	70%	74%	0.0	0.10
ED visits, 1 quarter before start date	0.6	1.3	1.4	0.1	0.04
ED visits, 2 to 4 quarters before start date	1.8	2.3	2.6	0.3	0.08
Inpatient stays, 1 quarter before start date	0.2	0.9	0.9	0.0	0.01
Inpatient stays, 2 to 4 quarters before start date	0.7	1.1	1.3	0.2	0.09
SNF stays, 1 quarter before start date	0.03	0.02	0.01	0.0	-0.06
SNF stays, 2 to 4 quarters before start date	0.12	0.05	0.05	0.0	0.02

Variable label	Comparison pool mean before matching (N = 2,247,995)	Weighted comparison mean after matching (N = 3,506)	Treatment mean (N = 783)	Treatment – Comparison difference after matching	Standardized difference after matching
Proportion of days covered by one or more CHF medications, 1 quarter before start date	31%	55%	58%	0.0	0.06
Proportion of days covered by one or more CHF medications, 2 to 4 quarters before start date	31%	46%	50%	0.0	0.10
Outpatient visits, 1 quarter before start date	2.7	4.2	4.3	0.1	0.04
Outpatient visits, 2 to 4 quarters before start date	8.1	9.2	10.1	0.8	0.09
Rural ZIP code	0.3%	0.2%	0.1%	0.0	-0.02
ZIP code fraction living in a food desert	4%	6%	5%	0.0	-0.02
ZIP code fraction in poverty	17%	14%	16%	0.0	0.16
Cancer	9%	9%	9%	0.0	-0.02
Obesity	33%	46%	53%	0.1	0.15
Diabetes	54%	53%	52%	0.0	-0.02
Standardized fill rate for CHF medication, 1 quarter before start date	2.1	4.9	5.5	0.6	0.12
Standardized fill rate for CHF medication, 2 to 4 quarters before start date	6.0	10.8	12.6	1.8	0.14
Start date during COVID-19 pandemic	31%	37%	35%	0.0	-0.03
County COVID cases, per million	2638	1954	2004	50	0.01
County COVID hospitalizations, per million	55	41	46	5.4	0.05
Participation in coordinated care initiative	3%	2%	2%	0.0	0.00
Fee-for-service Medi-Cal for 4 quarters prior to start date	2%	2%	1%	0.0	-0.13

Variable label	Comparison pool mean before matching (N = 2,247,995)	Weighted comparison mean after matching (N = 3,506)	Treatment mean (N = 783)	Treatment – Comparison difference after matching	Standardized difference after matching
Resides in Alameda County	6%	7%	7%	0.0	0.00
Resides in Los Angeles County	64%	31%	31%	0.0	0.00
Resides in San Diego County	19%	23%	23%	0.0	0.00
Resides in San Francisco County	3%	7%	7%	0.0	0.00
Resides in San Mateo County	1%	2%	2%	0.0	0.00
Resides in Santa Clara County	6%	18%	18%	0.0	0.00
Resides in Sonoma County	2%	12%	12%	0.0	0.00
CDPS score above the median	46%	55%	57%	0.0	0.04
MTM-qualifying CHF	46%	91%	91%	0.0	0.00
Other, non-MTM qualifying CHF	48%	79%	85%	0.1	0.19
Coronary artery disease	34%	43%	44%	0.0	0.02
Atrial fibrillation	25%	38%	40%	0.0	0.03
Cardiac arrhythmias	13%	19%	23%	0.0	0.09
Hypertension	77%	77%	78%	0.0	0.03
Valvular disease	4%	14%	13%	0.0	-0.01
Stage III or IV chronic kidney disease	19%	24%	27%	0.0	0.05
Developmental disability	1%	1%	1%	0.0	0.01
Homelessness ZIP code	5%	9%	10%	0.0	0.02
Has a diagnosis targeted by the MTM expansion	74%	79%	78%	0.0	-0.02
Any ED visits, 1 quarter before start date	31%	62%	62%	0.0	0.00
Any inpatient stays, 1 quarter before start date	18%	58%	58%	0.0	0.00
Inpatient days, 1 quarter before start date	1.5	4.5	4.5	0.0	0.00

Variable label	Comparison pool mean before matching (N = 2,247,995)	Weighted comparison mean after matching (N = 3,506)	Treatment mean (N = 783)	Treatment – Comparison difference after matching	Standardized difference after matching
Inpatient days, 2 to 4 quarters before start date	4.2	6.1	6.4	0.3	0.02
SNF days, 1 quarter before start date	0.4	0.4	0.4	0.0	0.00
SNF days, 2 to 4 quarters before start date	2.9	1.9	2.4	0.5	0.03
Any outpatient visits, 1 quarter before start date	75%	90%	90%	0.0	0.00
Hospitalized on start date	2%	2%	2%	0.0	-0.01
Days since last ED visits prior to start (missing flag)	0.1	0.1	0.1	0.0	-0.11
Days since last ED visits prior to start (missing, coded as 730)	254.0	162.0	149.4	-12.6	-0.06
Days since last inpatient stay prior to start date (missing flag)	0.3	0.1	0.1	0.0	-0.13
Days since last inpatient stay prior to start date (missing, coded as 730)	405.5	188.6	175.3	-13.4	-0.06
Days since last SNF stay prior to start date (missing flag)	0.9	0.9	0.9	0.0	-0.01
Days since last SNF stay prior to start date (missing, coded as 730)	679.5	697.2	695.1	-2.1	-0.02
Any ED visits with CHF primary diagnosis, 1 quarter before start date	1%	8%	10%	0.0	0.06
Any ED visits with CHF primary diagnosis, 2 to 4 quarters before start date	2%	7%	10%	0.0	0.09
Ambulance transports, 1 quarter before start date	0.1	0.3	0.3	0.0	0.01

Variable label	Comparison pool mean before matching (N = 2,247,995)	Weighted comparison mean after matching (N = 3,506)	Treatment mean (N = 783)	Treatment – Comparison difference after matching	Standardized difference after matching
Ambulance transports, 2 to 4 quarters before start date	0.3	0.5	0.5	0.0	0.02
Any inpatient stays with CHF primary diagnosis, 1 quarter before start date	0%	6%	7%	0.0	0.02
Any inpatient stays with CHF primary diagnosis, 2 to 4 quarters before start date	1%	4%	6%	0.0	0.10
Any inpatient stays with any ICU or CCU, 1 quarter before start date	7%	16%	17%	0.0	0.02
Any inpatient stays with any ICU or CCU, 2 to 4 quarters before start date	17%	18%	21%	0.0	0.08
Any SNF stays with CHF primary diagnosis, 1 quarter before start date	0%	1%	0%	0.0	-0.06
Any SNF stays with CHF primary diagnosis, 2 to 4 quarters before start date	1%	0%	1%	0.0	0.04
Any diuretic medication use, 1 quarter before start date	20%	55%	59%	0.0	0.09
Any diuretic medication use, 2 to 4 quarters before start date	24%	50%	56%	0.1	0.12
Chronic obstructive pulmonary disease	25%	37%	39%	0.0	0.05
HIV/AIDS	1%	2%	2%	0.0	0.00
Malnutrition	6%	7%	5%	0.0	-0.08
ED visits with CHF primary diagnosis, 1 quarter before start date	0.0	0.1	0.1	0.0	0.07
ED visits with CHF primary diagnosis, 2 to 4 quarters before start date	0.0	0.1	0.2	0.0	0.08

Variable label	Comparison pool mean before matching (N = 2,247,995)	Weighted comparison mean after matching (N = 3,506)	Treatment mean (N = 783)	Treatment – Comparison difference after matching	Standardized difference after matching
ED visits with CHF primary diagnosis, 5 to 8 quarters before start date	0.0	0.1	0.1	0.0	0.05
ED visits, 5 to 8 quarters before start date	2.2	2.4	2.9	0.5	0.12
Ambulance transports, 5 to 8 quarters before start date	0.3	0.3	0.5	0.2	0.12
Inpatient days with CHF primary diagnosis, 1 quarter before start date	0.0	0.4	0.5	0.1	0.05
Inpatient days with CHF primary diagnosis, 2 to 4 quarters before start date	0.1	0.3	0.7	0.4	0.04
Inpatient days with CHF primary diagnosis, 5 to 8 quarters before start date	0.1	0.3	0.4	0.1	0.04
Inpatient stays with CHF primary diagnosis, 1 quarter before start date	0.0	0.1	0.1	0.0	0.04
Inpatient stays with CHF primary diagnosis, 2 to 4 quarters before start date	0.0	0.1	0.1	0.0	0.07
Inpatient stays with CHF primary diagnosis, 5 to 8 quarters before start date	0.0	0.1	0.1	0.0	0.04
Inpatient days, 5 to 8 quarters before start date	4.7	5.0	6.3	1.4	0.09
Inpatient stays with any ICU or CCU, 1 quarter before start date	0.1	0.2	0.2	0.0	0.01
Inpatient stays with any ICU or CCU, 2 to 4 quarters before start date	0.2	0.3	0.3	0.1	0.08

Variable label	Comparison pool mean before matching (N = 2,247,995)	Weighted comparison mean after matching (N = 3,506)	Treatment mean (N = 783)	Treatment − Comparison difference after matching	Standardized difference after matching
Inpatient stays with any ICU or CCU, 5 to 8 quarters before start date	0.3	0.2	0.3	0.1	0.09
Inpatient stays, 5 to 8 quarters before start date	0.8	1.0	1.2	0.2	0.11
Outpatient visits, 5 to 8 quarters before start date	9.7	9.8	10.6	0.8	0.07
Primary care visits, 1 quarter before start date	0.9	1.6	1.6	0.0	0.00
Primary care visits, 2 to 4 quarters before start date	2.7	3.4	3.7	0.3	0.06
Primary care visits, 5 to 8 quarters before start date	3.2	3.5	3.8	0.3	0.05
Outpatient office visits, 1 quarter before start date	4.6	8.8	9.1	0.3	0.04
Outpatient office visits, 2 to 4 quarters before start date	13.3	16.0	16.8	0.8	0.05
Outpatient office visits, 5 to 8 quarters before start date	15.2	15.6	17.3	1.7	0.09
Any diuretic medication use, 5 to 8 quarters before start date	22%	38%	44%	0.1	0.12
Proportion of days covered by one or more CHF medications, 5 to 8 quarters before start date	27%	37%	40%	0.0	0.05
Standardized fill rate for CHF medication, 5 to 8 quarters before start date	6.7	10.5	12.0	1.5	0.10
Proportion of days covered by any ACE inhibitor or angiotensin receptor blocker, 1 quarter before start date	20%	32%	31%	0.0	-0.03

Variable label	Comparison pool mean before matching (N = 2,247,995)	Weighted comparison mean after matching (N = 3,506)	Treatment mean (N = 783)	Treatment – Comparison difference after matching	Standardized difference after matching
Proportion of days covered by any ACE inhibitor or angiotensin receptor blocker, 2 to 4 quarters before start date	20%	27%	28%	0.0	0.03
Proportion of days covered by any ACE inhibitor or angiotensin receptor blocker, 5 to 8 quarters before start date	18%	23%	23%	0.0	0.00
Proportion of days covered by any beta-blocker, 1 quarter before start date	16%	33%	38%	0.1	0.13
Proportion of days covered by any beta-blocker, 2 to 4 quarters before start date	15%	25%	30%	0.1	0.14
Proportion of days covered by any beta-blocker, 5 to 8 quarters before start date	12%	19%	23%	0.0	0.12
SNF days with CHF primary diagnosis, 1 quarter before start date	0.0	0.1	0.0	-0.1	-0.22
SNF days with CHF primary diagnosis, 2 to 4 quarters before start date	0.2	0.2	0.7	0.5	0.05
SNF days with CHF primary diagnosis, 5 to 8 quarters before start date	0.4	0.1	0.1	0.0	-0.01
SNF stays with CHF primary diagnosis, 1 quarter before start date	0.0	0.0	0.0	0.0	-0.06
SNF stays with CHF primary diagnosis, 2 to 4 quarters before start date	0.0	0.0	0.0	0.0	0.04
SNF stays with CHF primary diagnosis, 5 to 8 quarters before start date	0.0	0.0	0.0	0.0	0.03

Variable label	Comparison pool mean before matching (N = 2,247,995)	Weighted comparison mean after matching (N = 3,506)	Treatment mean (N = 783)	Treatment – Comparison difference after matching	Standardized difference after matching
SNF days, 5 to 8 quarters before start date	5.0	1.9	1.2	-0.7	-0.08
SNF stays, 5 to 8 quarters before start date	0.1	0.1	0.0	0.0	-0.08
Specialist visits, 1 quarter before start date	0.7	0.9	1.0	0.0	0.02
Specialist visits, 2 to 4 quarters before start date	2.3	2.2	2.3	0.1	0.03
Specialist visits, 5 to 8 quarters before start date	2.6	2.3	2.5	0.1	0.03
ZIP code fraction Black	10%	8%	9%	0.0	0.09
ZIP code fraction with at least a college degree	26%	30%	29%	0.0	-0.07
ZIP code fraction with at least a high school degree	79%	82%	81%	0.0	-0.15
ZIP code median income	64787.5	75081.0	71784.7	-3296.2	-0.12
ZIP code fraction Latinx	47%	39%	42%	0.0	0.13
ZIP code fraction unemployed	7%	7%	7%	0.0	0.08
ZIP code fraction White	52%	54%	52%	0.0	-0.09

Note: Comparison pool mean before matching includes all copies of potential comparison beneficiaries, equally weighted.

CHF = congestive heart failure; SNF = skilled nursing facility; ICU = intensive care unit; CCU = coronary care unit; ED = emergency department; MTM = medically tailored meal; CDPS = Chronic Illness and Disability Payment System

D. Regression models

Mathematica used a difference-in-differences regression design to estimate the impact of the MTM program. The difference-in-differences design accounts for any remaining differences between the treatment and comparison groups in beneficiary characteristics and baseline utilization after matching. The evaluation outcome variables were defined at the quarterly level, four quarters of data were included as a baseline period, and four quarters of data were included as the follow-up period. Separately, evaluators estimated the impact of the MTM program in the first, second, third, and fourth quarters of the follow-up period to observe the evolution of the MTM program's impact over time. This framework helped DHCS understand whether the program had its biggest impact in the first quarter, while individuals were still receiving MTMs, or if impacts took longer to manifest (or persist once MTMs are no longer being delivered). Evaluators found the biggest impacts typically occurred in the first quarter, while individuals were receiving MTMs. In addition to looking at this quarterly framework, evaluators also estimated the average impact at the semi-annual (six months) and annual level. Combining quarters into 6- or 12-month time periods improved statistical power to detect impacts over longer stretches of time but did not allow the assessment of the impact of the program changes over time.

The regression model:

$$Y_{ict} = \sum_{t=1}^{4} (\beta_{1t} * MTM_i * Qtr_t) + \beta_2 * MTM_i + \sum_{t=1}^{4} (\beta_{3t} * Qtr_t) + \beta_4 * X_{ict} + e_{ict}$$

In the regression model, Y_{ict} represents the outcome variable of interest for beneficiary i in county c and quarter t. MTM_i indicates whether the individual became engaged with MTM. Qtr_t represents a dummy variable for each quarter of the follow-up period. The four quarters of the baseline year are grouped together and omitted to use the full baseline period as the reference period. The four values of β_{1t} capture the impact of the program on the outcomes. X_{ict} contains a large set of beneficiary and county characteristics that were controlled for, such as age and chronic conditions, county fixed effects, and COVID-19 cases and hospitalizations, listed in **Table C.4**. Finally, e_{ict} represents the error term. Standard errors were corrected to account for repeated observations at the beneficiary level.

The main approach used a negative binomial regression model for count outcomes, logistic regression models for binary outcomes, and ordinary least squares for remaining outcomes. The negative binomial model is well suited to count variables that exhibit a skewed distribution, and the logistic regression is well suited for binary outcomes. Evaluators also used an ordinary least squares model with beneficiary-level fixed effects for the count outcomes as a robustness check.

Table C.4. Control variables in main specification, as of meal start date or pseudo start date

Control variables in regression model			
Health care utilization outcomes			
Demographic and enrollment characteristics			
Age	Sex	Race/ethnicity	Dually eligible
FFS Medicaid	CCI participation	Consecutive months of enrollment	
Health characteristics			
Type of CHF	Coronary artery disease	Hypertension	Valvular disease
Cardiac arrhythmia	Atrial fibrillation	Diabetes	Obesity
End-stage renal disease	Late-stage kidney disease	Cancer	Behavioral health disorder
Developmental disability	CDPS score	Any diagnosis targeted by the expanded MTM program	
Area-level characteristics			
County of residence	ZIP code percent in poverty	ZIP code food desert indicator	Rural ZIP code
Unemployment rate	Racial composition	Education	Monthly county COVID cases, per million, on start date
Monthly county COVID hospitalizations, per million, on start date			
Health outcomes			
Demographic, enrollment, area-level, and time characteristics			
Age	Sex	Race/ethnicity	Dually eligible
County indicator	CCI participation	Consecutive months of enrollment	Quarterly county COVID hospitalizations, per million
Quarterly county COVID hospitalizations, per million	Calendar year	Calendar quarter (Jan–Mar, Apr–Jun, Jul–Sep, Oct–Dec)	
Health characteristics			
Type of CHF	Coronary artery disease	Hypertension	Valvular disease
Cardiac arrhythmia	Atrial fibrillation	Diabetes	Obesity
End-stage renal disease	Late-stage kidney disease	Cancer	Behavioral health disorder
Developmental disability	CDPS score	Any diagnosis targeted by the expanded MTM program	

Control variables in regression model			
Area-level characteristics			
County of residence	ZIP code percent in poverty	ZIP code food desert indicator	Rural ZIP code
Unemployment rate	Racial composition	Education	Monthly county COVID cases, per million, on start date
Monthly county COVID hospitalizations, per million, on start date			
Health and health care utilization in last quarter of the baseline year			
ED visits	Inpatient stays	SNF stays	CHF medication coverage
Outpatient office visits	CDPS score		
Health and health care utilization in first three quarters of the baseline year			
ED visits	Inpatient stays	SNF stays	CHF medication coverage
Outpatient office visits			

Note: Blue shading reflects category headings. Unshaded entries represent variables included as controls.

CCI = coordinated care initiative; CDPS = Chronic Illness and Disability Payment System; CHF = congestive heart failure; ED = emergency department; FFS = fee for service; SNF = skilled nursing facility.

E.   Robustness checks

In addition to the main regression model described in **Table C.4.**, evaluators included the following robustness checks:

1. Linear models, instead of negative binomial or logistic regression models, with beneficiary-level fixed effects test whether the functional form in the non-linear models is unduly driving the results.

2. In cross-sectional models evaluators controlled for baseline utilization of the outcome variable in addition to other controls. For example, evaluators included a control for a beneficiary's baseline level of emergency department utilization when looking at emergency department utilization as an outcome. These models test for whether the difference-in-differences design is driving the results.

3. Evaluators used an event study framework to examine pre-MTM trends in utilization and to test the assumptions that beneficiaries enrolled in MTM and matched comparisons experienced parallel trends in utilization leading up to the start of a beneficiary's enrollment in the pilot program. The event study framework provided more evidence of whether the parallel trends assumption holds, a key assumption for difference-in-differences.

4. In another set of models, evaluators used a longer two-year baseline period and included two-years of follow up quarters. In these models, there were up to eight quarters of baseline observations and up to eight quarters of observations. This was to show whether a longer baseline period changes the results and whether there are any longer-run impacts.

5. Evaluators analyzed health care utilization outcomes as binary measures—meaning any utilization or no utilization—to confirm the findings also held when studying coarser measures of service use. This approach also tests whether there were impacts along the extensive margin such as: whether the MTM pilot program may cause some beneficiaries to go from no service use to some or some service use to none.

6. In some models, evaluators applied a top coding procedure to count outcomes by replacing all values above the 98th percentile of the distribution with the value at the 98th percentile. This approach ensures that extreme outliers are not driving the estimated impacts.

7. In some models, evaluators restricted the data to the period of time before the COVID-19 pandemic (before March 1, 2020) to ensure that the pandemic did not influence the estimated impacts. During the early months of the pandemic, health care utilization dropped considerably, which could bias the impact estimates during that period towards no effect.

Results from the full set of robustness checks is contained in Appendix D.

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Appendix D:
Additional Impact Evaluation Results

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In this appendix, Mathematica provides results from several robustness checks where varied components of the regression analysis were used to assess the dependence of the findings on particular modeling assumptions. Evaluators did the following: (1) used negative binomial models on main and supplemental outcomes (**Table D.1**), (2) ordinary least squares on main and supplemental outcome measures (**Table D.2**), (3) used binary outcome variables that show the probability of any visit in a quarter, rather than a count (**Table D.3**), (4) used top-coded count data outcomes winsorized at the 98th percentile (**Table D.4**), and (5) used event study models where the last quarter of the baseline period was the reference point (**Table D.5**), (6) used a two-year baseline and two-year follow-up period (**Table D.6**), (7) used cross-sectional models (**Table D.7**) and (8) restricted the sample to the pre-COVID 19 pandemic period (prior to March 2020) (**Table D.8**).

Results from each of these robustness checks support the main findings. Impact estimates using ordinary least squares for count variables are less precisely estimated than those using negative binomial regression, but they are similar in direction and magnitude. Annual outcomes are consistent with quarterly outcomes, and estimates using both binary and top-coded versions of the outcome measures exhibit similar patterns. The event study models, with a more flexible baseline period, also support the main findings.

A. Main sample

1. Main regression models

Table D.1. Impact estimates on main (+) and supplementary outcome measures using main regression models

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	*p*-value
Emergency department visits+					
Baseline	1.00	1.0			
Quarter 1	0.82	0.87	-0.03 (0.06)	-3.6%	0.59
Quarter 2	0.86	0.80	0.08 (0.07)	10%	0.26
Quarter 3	0.71	0.73	0.01 (0.07)	1.0%	0.92
Quarter 4	0.68	0.66	0.04 (0.08)	6.9%	0.56
Quarter 1–2	0.85	0.86	0.02 (0.05)	2.5%	0.70
Quarter 3–4	0.71	0.71	0.04 (0.06)	5.2%	0.58
Quarter 1–4	0.83	0.84	0.01 (0.05)	1.4%	0.82
Emergency department visits with primary diagnosis of congestive heart failure					
Baseline	0.07	0.05			
Quarter 1	0.03	0.02	-0.01 (0.01)	-14%	0.58
Quarter 2	0.05	0.03	0.00 (0.01)	1.8%	0.95
Quarter 3	0.03	0.03	-0.01 (0.01)	-32%	0.24
Quarter 4	0.04	0.03	-0.01 (0.01)	-13%	0.68
Quarter 1–2	0.05	0.03	0.00 (0.01)	2.6%	0.92
Quarter 3–4	0.04	0.03	-0.01 (0.01)	-18%	0.45
Quarter 1–4	0.05	0.03	-0.00 (0.01)	-5.3%	0.80
Ambulance transports					
Baseline	0.20	0.21			
Quarter 1	0.21	0.23	-0.00 (0.03)	<1%	1.00
Quarter 2	0.20	0.21	0.00 (0.03)	2.5%	0.88
Quarter 3	0.18	0.17	0.02 (0.03)	15%	0.45
Quarter 4	0.15	0.18	-0.01 (0.03)	-7.4%	0.72
Quarter 1–2	0.21	0.22	0.01 (0.03)	2.7%	0.86
Quarter 3–4	0.17	0.18	0.01 (0.03)	7.6%	0.67
Quarter 1–4	0.20	0.20	0.01 (0.03)	6.4%	0.66
Inpatient stays+					
Baseline	0.55	0.55			
Quarter 1	0.39	0.40	-0.01 (0.03)	-1.9%	0.80
Quarter 2	0.38	0.37	0.02 (0.03)	6.1%	0.53
Quarter 3	0.34	0.32	0.03 (0.03)	9.7%	0.36
Quarter 4	0.30	0.29	0.02 (0.03)	6.6%	0.59
Quarter 1–2	0.40	0.40	0.01 (0.03)	2.5%	0.73
Quarter 3–4	0.34	0.32	0.03 (0.03)	11%	0.25
Quarter 1–4	0.40	0.39	0.01 (0.03)	3.0%	0.65

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Inpatient days					
Baseline	2.9	3.0			
Quarter 1	2.3	2.6	-0.17 (0.32)	-7.0%	0.59
Quarter 2	2.5	2.4	0.29 (0.35)	13%	0.40
Quarter 3	2.1	2.3	-0.04 (0.34)	-1.8%	0.91
Quarter 4	1.9	2.0	0.08 (0.39)	4.1%	0.85
Quarter 1–2	2.4	2.5	0.08 (0.25)	3.4%	0.75
Quarter 3–4	2.1	2.2	0.08 (0.28)	3.9%	0.77
Quarter 1–4	2.4	2.5	0.04 (0.22)	1.7%	0.85
Inpatient stays with primary diagnosis of congestive heart failure					
Baseline	0.04	0.03			
Quarter 1	0.02	0.02	-0.01 (0.01)	-33%	0.20
Quarter 2	0.03	0.02	-0.00 (0.01)	-6.3%	0.84
Quarter 3	0.02	0.02	-0.00 (0.01)	-11%	0.73
Quarter 4	0.01	0.01	-0.01 (0.01)	-50%	0.13
Quarter 1–2	0.03	0.02	-0.00 (0.01)	-14%	0.58
Quarter 3–4	0.02	0.01	-0.01 (0.01)	-28%	0.26
Quarter 1–4	0.02	0.02	-0.01 (0.01)	-21%	0.30
Inpatient days with primary diagnosis of congestive heart failure					
Baseline	0.29	0.22			
Quarter 1	0.10	0.13	-0.16** (0.07)	-62%	0.03
Quarter 2	0.12	0.13	-0.14* (0.07)	-55%	0.05
Quarter 3	0.20	0.12	-0.04 (0.10)	-15%	0.70
Quarter 4	0.08	0.64	-0.69 (0.58)	-90%	0.24
Quarter 1–2	0.10	0.13	-0.11** (0.05)	-53%	0.03
Quarter 3–4	0.16	0.21	-0.13 (0.10)	-46%	0.19
Quarter 1–4	0.14	0.14	-0.08 (0.05)	-37%	0.14
Inpatient stays with any intensive care unit or coronary care					
Baseline	0.13	0.12			
Quarter 1	0.11	0.11	-0.00 (0.02)	-2.5%	0.86
Quarter 2	0.11	0.10	-0.00 (0.02)	-4.2%	0.79
Quarter 3	0.08	0.08	-0.02 (0.01)	-18%	0.25
Quarter 4	0.07	0.07	-0.00 (0.02)	-5.4%	0.79
Quarter 1–2	0.11	0.10	-0.00 (0.01)	-2.8%	0.81
Quarter 3–4	0.08	0.08	-0.01 (0.01)	-11%	0.49
Quarter 1–4	0.10	0.10	-0.01 (0.01)	-7.4%	0.47
Skilled nursing facility stays+					
Baseline	0.02	0.02			
Quarter 1	0.02	0.03	-0.00 (0.01)	-18%	0.56
Quarter 2	0.03	0.03	0.00 (0.01)	19%	0.59
Quarter 3	0.03	0.02	0.02 (0.01)	82%	0.18
Quarter 4	0.02	0.03	-0.01 (0.01)	-36%	0.23
Quarter 1–2	0.02	0.03	-0.00 (0.01)	-6.5%	0.79

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Quarter 3–4	0.03	0.02	0.00 (0.01)	3.6%	0.91
Quarter 1–4	0.03	0.02	-0.00 (0.01)	<1%	0.99
Skilled nursing facility days					
Baseline	0.96	1.6			
Quarter 1	4.7	12	-4.0 (3.9)	-46%	0.30
Quarter 2	3.5	26	-19* (11)	-85%	0.08
Quarter 3	5.9	6.7	2.7 (3.5)	86%	0.43
Quarter 4	4.4	11	-3.1 (5.0)	-41%	0.54
Quarter 1–2	2.3	7.8	-4.5** (2.3)	-66%	0.05
Quarter 3–4	2.0	4.9	-1.9 (1.7)	-49%	0.27
Quarter 1–4	1.5	4.0	-1.8* (0.95)	-55%	0.06
Proportion of unique days covered by any congestive heart failure prescription+					
Baseline	0.52	0.49			
Quarter 1	0.63	0.59	0.01 (0.01)	2.2%	0.23
Quarter 2	0.62	0.57	0.02 (0.01)	3.3%	0.13
Quarter 3	0.60	0.56	0.02 (0.01)	2.6%	0.30
Quarter 4	0.59	0.56	0.01 (0.02)	<1%	0.74
Quarter 1–2	0.62	0.58	0.02 (0.01)	2.7%	0.14
Quarter 3–4	0.60	0.56	0.01 (0.01)	1.9%	0.44
Quarter 1–4	0.62	0.58	0.01 (0.01)	1.9%	0.33
Proportion of unique days covered by beta blockers					
Baseline	0.32	0.28			
Quarter 1	0.41	0.34	0.03** (0.01)	6.7%	0.05
Quarter 2	0.38	0.33	0.01 (0.01)	3.5%	0.36
Quarter 3	0.37	0.32	0.01 (0.02)	1.8%	0.69
Quarter 4	0.37	0.33	0.01 (0.02)	1.6%	0.74
Quarter 1–2	0.40	0.34	0.02 (0.01)	5.0%	0.13
Quarter 3–4	0.37	0.33	0.01 (0.02)	1.4%	0.74
Quarter 1–4	0.39	0.34	0.01 (0.01)	3.1%	0.35
Proportion of unique days covered by ACE inhibitors or angiotensin receptor blockers					
Baseline	0.28	0.29			
Quarter 1	0.31	0.33	-0.01 (0.01)	-3.5%	0.38
Quarter 2	0.28	0.31	-0.02 (0.01)	-6.6%	0.18
Quarter 3	0.27	0.29	-0.01 (0.02)	-3.9%	0.49
Quarter 4	0.26	0.28	-0.01 (0.02)	-3.9%	0.54
Quarter 1–2	0.29	0.32	-0.02 (0.01)	-4.9%	0.23
Quarter 3–4	0.27	0.29	-0.01 (0.02)	-3.7%	0.51
Quarter 1–4	0.28	0.30	-0.01 (0.01)	-4.6%	0.29
Standardized number of prescription fills					
Baseline	4.5	4.1			
Quarter 1	6.1	5.3	0.53** (0.21)	9.5%	0.01
Quarter 2	5.7	5.0	0.46* (0.25)	8.8%	0.06
Quarter 3	5.5	4.8	0.45 (0.28)	8.9%	0.11

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Quarter 4	5.1	4.6	0.24 (0.27)	4.9%	0.38
Quarter 1–2	5.8	5.1	0.46** (0.19)	8.5%	0.01
Quarter 3–4	5.3	4.7	0.38 (0.25)	7.7%	0.12
Quarter 1–4	5.6	4.9	0.35** (0.17)	6.6%	0.04
Outpatient visits to primary care physician or specialist+					
Baseline	3.6	3.4			
Quarter 1	4.0	3.5	0.39*** (0.13)	11%	<0.01
Quarter 2	3.4	3.2	0.03 (0.13)	<1%	0.81
Quarter 3	3.1	2.9	0.02 (0.15)	<1%	0.90
Quarter 4	2.9	2.8	-0.12 (0.16)	-3.9%	0.46
Quarter 1–2	3.7	3.3	0.19* (0.11)	5.3%	0.09
Quarter 3–4	3.0	2.9	-0.08 (0.13)	-2.7%	0.54
Quarter 1–4	3.5	3.2	0.07 (0.11)	2.0%	0.52
Primary care visits					
Baseline	1.3	1.3			
Quarter 1	1.4	1.4	0.11 (0.08)	8.9%	0.13
Quarter 2	1.2	1.2	0.02 (0.08)	1.4%	0.84
Quarter 3	1.1	1.1	0.04 (0.09)	4.2%	0.61
Quarter 4	0.93	1.1	-0.07 (0.09)	-7.1%	0.43
Quarter 1–2	1.3	1.3	0.06 (0.07)	4.5%	0.39
Quarter 3–4	1.0	1.1	-0.02 (0.08)	-1.9%	0.80
Quarter 1–4	1.2	1.2	0.02 (0.06)	1.6%	0.76
Specialist visits					
Baseline	0.83	0.82			
Quarter 1	1.0	0.93	0.12** (0.06)	13%	0.04
Quarter 2	0.90	0.90	0.03 (0.07)	3.8%	0.62
Quarter 3	0.71	0.85	-0.11 (0.07)	-13%	0.13
Quarter 4	0.66	0.82	-0.13* (0.07)	-16%	0.09
Quarter 1–2	0.98	0.91	0.08 (0.05)	8.4%	0.15
Quarter 3–4	0.70	0.83	-0.13** (0.06)	-15%	0.04
Quarter 1–4	0.91	0.90	-0.00 (0.05)	<1%	0.94

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date),in each quarter of the follow-up period, each 6-month period in the follow-up period, and a full year of follow up. 31,768 beneficiary-quarters are included. Negative binomial regression models used for count outcomes and ordinary least squares regressions for continuous measures. None of the models included fixed effects.

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

+ Denotes one of five main outcomes

a Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

2. Linear regression models with beneficiary-level fixed effects

Table D.2. Impact estimates on main (+) and supplementary outcome measures using linear regression models with beneficiary-level fixed effects

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Emergency department visits+					
Baseline	1.0	0.90			
Quarter 1	0.84	0.80	-0.07 (0.06)	-7.3%	0.27
Quarter 2	0.85	0.72	0.03 (0.06)	3.6%	0.65
Quarter 3	0.73	0.64	-0.01 (0.06)	-1.3%	0.88
Quarter 4	0.65	0.59	-0.04 (0.07)	-5.1%	0.62
Quarter 1–2	0.84	0.77	-0.02 (0.05)	-2.5%	0.68
Quarter 3–4	0.69	0.62	-0.02 (0.06)	-3.2%	0.69
Quarter 1–4	0.78	0.71	-0.02 (0.04)	-3.0%	0.59
Inpatient stays+					
Baseline	0.55	0.49			
Quarter 1	0.40	0.37	-0.03 (0.03)	-7.0%	0.32
Quarter 2	0.39	0.35	-0.02 (0.03)	-4.7%	0.59
Quarter 3	0.36	0.32	-0.02 (0.03)	-4.6%	0.61
Quarter 4	0.30	0.29	-0.05 (0.03)	-15%	0.11
Quarter 1–2	0.39	0.36	-0.03 (0.03)	-6.0%	0.35
Quarter 3–4	0.33	0.31	-0.03 (0.03)	-9.2%	0.23
Quarter 1–4	0.37	0.34	-0.03 (0.02)	-7.4%	0.21
Skilled nursing facility stays+					
Baseline	0.02	0.01			
Quarter 1	0.02	0.03	-0.01 (0.01)	-35%	0.17
Quarter 2	0.03	0.02	0.00 (0.01)	4.3%	0.89
Quarter 3	0.03	0.02	0.01 (0.01)	29%	0.52
Quarter 4	0.02	0.03	-0.01 (0.01)	-41%	0.16
Quarter 1–2	0.02	0.02	-0.00 (0.01)	-18%	0.42
Quarter 3–4	0.02	0.02	-0.00 (0.01)	-9.5%	0.75
Quarter 1–4	0.02	0.02	-0.00 (0.01)	-15%	0.49
Proportion of unique days covered by any congestive heart failure prescription+					
Baseline	0.52	0.47			
Quarter 1	0.61	0.56	0.01 (0.01)	1.4%	0.46
Quarter 2	0.59	0.53	0.01 (0.01)	2.3%	0.31
Quarter 3	0.56	0.50	0.01 (0.02)	1.8%	0.51
Quarter 4	0.53	0.49	-0.00 (0.02)	<1%	0.89
Quarter 1–2	0.60	0.54	0.01 (0.01)	1.8%	0.36
Quarter 3–4	0.55	0.50	0.00 (0.01)	<1%	0.77
Quarter 1–4	0.58	0.53	0.01 (0.01)	1.3%	0.53
Outpatient visits to primary care physician or specialist+					
Baseline	3.6	3.2			

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	*p*-value
Quarter 1	3.9	3.3	0.33*** (0.12)	9.3%	<0.01
Quarter 2	3.3	3.0	-0.08 (0.13)	-2.2%	0.54
Quarter 3	3.1	2.7	0.06 (0.14)	2.0%	0.67
Quarter 4	2.7	2.6	-0.19 (0.16)	-6.4%	0.21
Quarter 1–2	3.6	3.1	0.14 (0.10)	4.0%	0.17
Quarter 3–4	2.9	2.6	-0.05 (0.13)	-1.6%	0.71
Quarter 1–4	3.3	2.9	0.05 (0.10)	1.6%	0.58

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date) and in each quarter of the follow-up period. 31,768 beneficiary-quarters are included. ordinary least squares models with beneficiary-level fixed effects.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[+] Denotes one of five main outcomes

[a] Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

3. Main regression models with binary outcomes

Table D.3. Impact estimates using binary outcome measures

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
1+ Emergency department visits					
Baseline	88	84			
Quarter 1	37	36	1.2 (1.9)	3.3%	0.53
Quarter 2	37	33	3.5* (1.9)	11%	0.07
Quarter 3	32	33	-1.2 (2.0)	-3.6%	0.56
Quarter 4	31	29	2.2 (2.2)	7.5%	0.32
Quarter 1–2	53	49	4.0** (1.9)	8.1%	0.04
Quarter 3–4	45	45	0.08 (2.2)	<1%	0.97
Quarter 1–4	66	63	3.2* (1.8)	5.1%	0.07
1+ Inpatient stays					
Baseline	83	81			
Quarter 1	25	25	0.37 (1.7)	1.5%	0.83
Quarter 2	25	23	1.8 (1.8)	7.9%	0.30
Quarter 3	22	22	0.35 (1.8)	1.6%	0.85
Quarter 4	21	20	1.9 (1.9)	9.6%	0.33
Quarter 1–2	39	36	2.6 (1.9)	7.1%	0.17
Quarter 3–4	33	32	1.4 (2.1)	4.5%	0.50
Quarter 1–4	51	49	1.5 (2.0)	3.1%	0.43
1+ Skilled nursing facility stays					
Baseline	5.1	4.7			
Quarter 1	1.4	2.4	-0.99* (0.53)	-41%	0.06
Quarter 2	2.5	2.1	0.37 (0.65)	17%	0.58
Quarter 3	2.0	1.6	0.44 (0.59)	28%	0.46
Quarter 4	1.8	2.1	-0.40 (0.68)	-19%	0.56
Quarter 1–2	3.4	4.3	-0.90 (0.76)	-21%	0.24
Quarter 3–4	3.2	3.6	-0.40 (0.79)	-11%	0.61
Quarter 1–4	5.4	6.9	-1.5 (0.94)	-21%	0.12
1+ Outpatient office visits					
Baseline	98	97			
Quarter 1	86	80	6.2*** (1.4)	7.8%	<0.01
Quarter 2	81	76	5.5*** (1.6)	7.3%	<0.01
Quarter 3	77	74	2.7 (1.8)	3.6%	0.15
Quarter 4	74	72	1.6 (2.1)	2.3%	0.43
Quarter 1–2	94	88	5.4*** (0.95)	6.2%	<0.01
Quarter 3–4	86	84	2.0 (1.5)	2.4%	0.17
Quarter 1–4	96	93	3.4*** (0.66)	3.6%	<0.01

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date) and in each quarter of the follow-up period. 31,768 beneficiary-quarters are included. Inpatient and skilled nursing facility variables that capture counts of days are equivalent to variables capturing the number of stays when the outcome is binary because all

stays include at least one day, and all days correspond to a single stay. Evaluators used logistic regression models.

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

[a] Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

4. Main regression models with top-coded outcomes

Table D.4. Impact estimates using top-coded count outcomes (winsorized at 98th percentile)

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Emergency department visits+					
Baseline	0.96	0.97			
Quarter 1	0.76	0.78	-0.00 (0.05)	<1%	0.99
Quarter 2	0.78	0.75	0.06 (0.06)	7.8%	0.32
Quarter 3	0.66	0.67	0.00 (0.05)	<1%	0.95
Quarter 4	0.65	0.60	0.07 (0.06)	12%	0.24
Quarter 1–2	0.80	0.79	0.03 (0.04)	4.3%	0.46
Quarter 3–4	0.68	0.67	0.04 (0.05)	6.2%	0.44
Quarter 1–4	0.80	0.79	0.03 (0.04)	3.5%	0.53
Emergency department visits with primary diagnosis of congestive heart failure					
Baseline	0.06	0.05			
Quarter 1	0.02	0.02	-0.01 (0.01)	-19%	0.46
Quarter 2	0.03	0.02	-0.00 (0.01)	<1%	0.99
Quarter 3	0.02	0.02	-0.01 (0.01)	-40%	0.11
Quarter 4	0.03	0.02	0.01 (0.01)	19%	0.57
Quarter 1–2	0.03	0.03	-0.00 (0.01)	-11%	0.62
Quarter 3–4	0.03	0.03	-0.01 (0.01)	-16%	0.52
Quarter 1–4	0.04	0.03	-0.00 (0.01)	-9.5%	0.62
Ambulance transports					
Baseline	0.18	0.18			
Quarter 1	0.16	0.17	-0.00 (0.02)	-1.3%	0.92
Quarter 2	0.15	0.15	-0.00 (0.02)	-1.1%	0.94
Quarter 3	0.14	0.13	0.01 (0.02)	5.7%	0.74
Quarter 4	0.11	0.12	-0.01 (0.02)	-4.4%	0.82
Quarter 1–2	0.16	0.17	0.00 (0.02)	<1%	0.99
Quarter 3–4	0.13	0.13	0.01 (0.02)	4.3%	0.78
Quarter 1–4	0.16	0.16	0.00 (0.02)	1.3%	0.91
Inpatient stays+					
Baseline	0.55	0.55			
Quarter 1	0.38	0.39	-0.00 (0.03)	<1%	0.92
Quarter 2	0.37	0.35	0.03 (0.03)	8.0%	0.41
Quarter 3	0.33	0.31	0.03 (0.03)	10%	0.33
Quarter 4	0.29	0.28	0.02 (0.03)	8.3%	0.48
Quarter 1–2	0.39	0.38	0.01 (0.03)	3.4%	0.62
Quarter 3–4	0.33	0.31	0.03 (0.03)	10%	0.28
Quarter 1–4	0.39	0.38	0.01 (0.02)	3.4%	0.60
Inpatient days					
Baseline	2.7	2.9			
Quarter 1	2.0	2.3	-0.08 (0.25)	-3.8%	0.75

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Quarter 2	2.3	2.1	0.36 (0.29)	19%	0.22
Quarter 3	1.9	1.9	0.10 (0.26)	5.4%	0.71
Quarter 4	1.6	1.7	0.06 (0.29)	3.8%	0.84
Quarter 1–2	2.3	2.3	0.14 (0.23)	6.7%	0.53
Quarter 3–4	2.0	2.0	0.17 (0.23)	9.3%	0.47
Quarter 1–4	2.3	2.4	0.10 (0.20)	4.3%	0.63
Inpatient stays with primary diagnosis of congestive heart failure					
Baseline	0.04	0.03			
Quarter 1	0.01	0.02	-0.01 (0.01)	-36%	0.16
Quarter 2	0.02	0.01	0.00 (0.01)	6.8%	0.83
Quarter 3	0.02	0.01	0.00 (0.01)	6.7%	0.85
Quarter 4	0.01	0.01	-0.01 (0.01)	-29%	0.40
Quarter 1–2	0.02	0.02	-0.01 (0.01)	-20%	0.38
Quarter 3–4	0.02	0.01	-0.00 (0.01)	-17%	0.54
Quarter 1–4	0.02	0.02	-0.01 (0.01)	-20%	0.37
Inpatient days with primary diagnosis of congestive heart failure					
Baseline	0.19	0.15			
Quarter 1	0.05	0.07	-0.06** (0.03)	-53%	0.04
Quarter 2	0.07	0.06	-0.03 (0.03)	-30%	0.33
Quarter 3	0.11	0.05	0.02 (0.05)	25%	0.63
Quarter 4	0.03	0.06	-0.07** (0.03)	-67%	0.04
Quarter 1–2	0.08	0.08	-0.05* (0.03)	-39%	0.09
Quarter 3–4	0.10	0.08	-0.02 (0.04)	-14%	0.67
Quarter 1–4	0.10	0.09	-0.03 (0.03)	-22%	0.36
Inpatient stays with any intensive care unit or coronary care					
Baseline	0.13	0.12			
Quarter 1	0.10	0.10	-0.00 (0.01)	-4.5%	0.72
Quarter 2	0.10	0.09	-0.00 (0.02)	-3.8%	0.80
Quarter 3	0.07	0.08	-0.01 (0.01)	-16%	0.30
Quarter 4	0.07	0.07	-0.01 (0.02)	-8.4%	0.67
Quarter 1–2	0.11	0.10	-0.00 (0.01)	-3.2%	0.78
Quarter 3–4	0.08	0.07	-0.01 (0.01)	-9.9%	0.50
Quarter 1–4	0.10	0.10	-0.01 (0.01)	-7.9%	0.44
Skilled nursing facility stays+					
Baseline	0.02	0.02			
Quarter 1	0.01	0.02	-0.01 (0.01)	-32%	0.21
Quarter 2	0.03	0.02	0.01 (0.01)	29%	0.43
Quarter 3	0.02	0.01	0.01 (0.01)	37%	0.40
Quarter 4	0.02	0.02	-0.01 (0.01)	-23%	0.48
Quarter 1–2	0.02	0.02	-0.00 (0.01)	-4.6%	0.84
Quarter 3–4	0.02	0.02	0.00 (0.01)	10.0%	0.75
Quarter 1–4	0.02	0.02	0.00 (0.01)	1.4%	0.95

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Skilled nursing facility days					
Baseline	0.59	0.76			
Quarter 1	0.47	0.79	-0.02 (0.23)	-4.3%	0.93
Quarter 2	0.49	1.3	-0.51 (0.41)	-51%	0.21
Quarter 3	0.87	0.50	0.66* (0.36)	315%	0.06
Quarter 4	0.47	0.81	-0.04 (0.32)	-7.8%	0.90
Quarter 1–2	0.67	1.4	-0.44 (0.33)	-40%	0.18
Quarter 3–4	0.64	1.0	-0.12 (0.31)	-16%	0.70
Quarter 1–4	0.76	1.5	-0.57* (0.34)	-43%	0.10
Standardized number of prescription fills					
Baseline	4.5	4.1			
Quarter 1	6.1	5.3	0.52** (0.21)	9.3%	0.01
Quarter 2	5.7	5.0	0.45* (0.24)	8.7%	0.06
Quarter 3	5.5	4.8	0.46 (0.28)	9.0%	0.10
Quarter 4	5.1	4.6	0.24 (0.27)	4.8%	0.38
Quarter 1–2	5.8	5.1	0.45** (0.19)	8.3%	0.02
Quarter 3–4	5.3	4.7	0.37 (0.24)	7.6%	0.13
Quarter 1–4	5.6	4.9	0.34** (0.17)	6.4%	0.04
Outpatient visits to primary care physician or specialist+					
Baseline	3.6	3.4			
Quarter 1	4.0	3.5	0.39*** (0.13)	11%	<0.01
Quarter 2	3.4	3.2	0.03 (0.13)	<1%	0.81
Quarter 3	3.1	2.9	0.02 (0.15)	<1%	0.90
Quarter 4	2.9	2.8	-0.12 (0.16)	-3.9%	0.46
Quarter 1–2	3.7	3.3	0.19* (0.11)	5.3%	0.09
Quarter 3–4	3.0	2.9	-0.08 (0.13)	-2.7%	0.54
Quarter 1–4	3.5	3.2	0.07 (0.11)	2.0%	0.52
Primary care visits					
Baseline	1.3	1.3			
Quarter 1	1.4	1.4	0.11 (0.08)	8.9%	0.13
Quarter 2	1.2	1.2	0.02 (0.08)	1.4%	0.84
Quarter 3	1.1	1.1	0.04 (0.09)	4.2%	0.61
Quarter 4	0.93	1.1	-0.07 (0.09)	-7.1%	0.43
Quarter 1–2	1.3	1.3	0.06 (0.07)	4.5%	0.39
Quarter 3–4	1.0	1.1	-0.02 (0.08)	-1.9%	0.80
Quarter 1–4	1.2	1.2	0.02 (0.06)	1.6%	0.76
Specialist visits					
Baseline	0.83	0.82			
Quarter 1	1.0	0.93	0.12** (0.06)	13%	0.04
Quarter 2	0.90	0.90	0.03 (0.07)	3.8%	0.62
Quarter 3	0.71	0.85	-0.11 (0.07)	-13%	0.13
Quarter 4	0.66	0.82	-0.13* (0.07)	-16%	0.09
Quarter 1–2	0.98	0.91	0.08 (0.05)	8.4%	0.15

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	*p*-value
Quarter 3–4	0.70	0.83	-0.13** (0.06)	-15%	0.04
Quarter 1–4	0.91	0.90	-0.00 (0.05)	<1%	0.94

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date) and in each quarter of the follow-up period. 31,768 beneficiary-quarters are included.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[+] Denotes one of five main outcomes

[a] Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

5. Main regression models with event study framework

Table D.5. Impact estimates using event study framework

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	*p*-value
Emergency department visits+					
Quarter -3	0.69	0.71	-0.01 (0.08)	<1%	0.95
Quarter -2	0.83	0.77	0.07 (0.09)	8.9%	0.43
Quarter -1	0.86	0.94	-0.06 (0.08)	-6.4%	0.46
Quarter 0 (reference)	1.5	1.5			
Quarter 1	0.82	0.87	-0.04 (0.08)	-4.8%	0.59
Quarter 2	0.87	0.81	0.07 (0.09)	9.1%	0.40
Quarter 3	0.73	0.75	0.00 (0.09)	<1%	1.00
Quarter 4	0.71	0.68	0.04 (0.10)	6.0%	0.68
Inpatient stays+					
Quarter -3	0.35	0.33	0.05 (0.05)	17%	0.30
Quarter -2	0.40	0.38	0.06 (0.05)	17%	0.24
Quarter -1	0.47	0.49	0.01 (0.05)	1.8%	0.87
Quarter 0 (reference)	0.91	0.95			
Quarter 1	0.40	0.42	0.01 (0.05)	3.5%	0.76
Quarter 2	0.40	0.39	0.05 (0.05)	13%	0.36
Quarter 3	0.37	0.35	0.06 (0.05)	18%	0.25
Quarter 4	0.33	0.31	0.05 (0.05)	17%	0.38
Skilled nursing facility stays+					
Quarter -3	0.02	0.01	0.01 (0.01)	76%	0.19
Quarter -2	0.01	0.02	-0.00 (0.01)	-6.2%	0.90
Quarter -1	0.01	0.02	-0.00 (0.01)	-10%	0.82
Quarter 0 (reference)	0.01	0.02			
Quarter 1	0.02	0.03	-0.00 (0.01)	-13%	0.72
Quarter 2	0.03	0.02	0.01 (0.01)	28%	0.50
Quarter 3	0.03	0.02	0.02 (0.01)	100%	0.16
Quarter 4	0.02	0.03	-0.01 (0.01)	-33%	0.33
Proportion of unique days covered by any congestive heart failure prescription+					
Quarter -3	0.44	0.41	0.02 (0.01)	3.6%	0.28
Quarter -2	0.49	0.45	0.01 (0.01)	3.1%	0.24
Quarter -1	0.52	0.49	0.02 (0.01)	3.0%	0.13
Quarter 0 (reference)	0.58	0.56			
Quarter 1	0.62	0.58	0.02** (0.01)	3.8%	0.02
Quarter 2	0.62	0.57	0.03** (0.01)	5.0%	0.02
Quarter 3	0.61	0.56	0.03* (0.01)	4.4%	0.08
Quarter 4	0.59	0.56	0.02 (0.02)	2.7%	0.32
Outpatient visits to primary care physician or specialist+					
Quarter -3	2.9	2.8	0.00 (0.17)	<1%	1.00
Quarter -2	3.3	3.1	0.09 (0.16)	2.7%	0.59

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Quarter -1	3.6	3.3	0.13 (0.14)	3.8%	0.35
Quarter 0 (reference)	4.4	4.3			
Quarter 1	4.1	3.5	0.43*** (0.14)	12%	<0.01
Quarter 2	3.4	3.2	0.07 (0.15)	2.2%	0.63
Quarter 3	3.2	3.0	0.07 (0.17)	2.1%	0.70
Quarter 4	3.0	2.9	-0.07 (0.19)	-2.3%	0.71

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date) and in each quarter of the follow-up period. 31,768 beneficiary-quarters are included.

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

[+] Denotes one of five main outcomes

[a] Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

6. Main regression models with two-year baseline and two-year follow-up periods

Table D.6. Impact estimates using two-year baseline and two-year follow-up periods

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Emergency department visits+					
Baseline	0.89	0.86			
Quarter 1	0.75	0.80	-0.09 (0.05)	-10%	0.11
Quarter 2	0.78	0.73	0.02 (0.07)	2.6%	0.77
Quarter 3	0.65	0.65	-0.04 (0.06)	-6.4%	0.49
Quarter 4	0.61	0.58	-0.01 (0.07)	-2.0%	0.86
Quarter 5	0.57	0.61	-0.08 (0.07)	-13%	0.26
Quarter 6	0.64	0.49	0.12 (0.08)	22%	0.14
Quarter 7	0.55	0.45	0.07 (0.07)	14%	0.33
Quarter 8	0.02	0.00	-0.02 (0.04)	-53%	0.56
Quarter 1–2	0.77	0.78	-0.04 (0.05)	-4.6%	0.46
Quarter 3–4	0.64	0.63	-0.02 (0.06)	-2.7%	0.76
Quarter 5–6	0.63	0.56	0.04 (0.07)	6.4%	0.56
Quarter 7–8	0.35	0.25	0.08 (0.05)	28%	0.14
Quarter 1–8	0.73	0.74	-0.03 (0.04)	-4.0%	0.50
Inpatient stays+					
Baseline	0.44	0.42			
Quarter 1	0.33	0.34	-0.03 (0.03)	-8.5%	0.24
Quarter 2	0.32	0.31	-0.01 (0.03)	-1.6%	0.86
Quarter 3	0.28	0.27	0.00 (0.03)	<1%	0.95
Quarter 4	0.23	0.23	-0.01 (0.03)	-4.3%	0.69
Quarter 5	0.26	0.25	-0.00 (0.03)	<1%	0.98
Quarter 6	0.28	0.20	0.07* (0.04)	33%	0.05
Quarter 7	0.23	0.18	0.04 (0.03)	21%	0.20
Quarter 8	0.01	0.00	-0.01 (0.02)	-51%	0.60
Quarter 1–2	0.34	0.33	-0.02 (0.02)	-5.6%	0.38
Quarter 3–4	0.29	0.25	0.00 (0.02)	1.2%	0.89
Quarter 5–6	0.31	0.22	0.05 (0.03)	19%	0.13
Quarter 7–8	0.17	0.10	0.03 (0.03)	25%	0.20
Quarter 1–8	0.31	0.31	-0.01 (0.02)	-2.5%	0.69
Skilled nursing facility stays+					
Baseline	0.01	0.01			
Quarter 1	0.02	0.02	-0.00 (0.01)	-16%	0.62
Quarter 2	0.03	0.02	0.01 (0.01)	28%	0.45
Quarter 3	0.03	0.02	0.01 (0.01)	97%	0.16
Quarter 4	0.02	0.03	-0.01 (0.01)	-33%	0.30
Quarter 5	0.02	0.02	0.00 (0.01)	21%	0.72
Quarter 6	0.02	0.02	0.00 (0.01)	1.5%	0.98
Quarter 7	0.02	0.01	0.01 (0.01)	58%	0.43

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Quarter 8	0.00	0.00	0.00 (0.00)	-100%	0.64
Quarter 1–2	0.02	0.02	-0.00 (0.01)	-6.2%	0.80
Quarter 3–4	0.02	0.02	0.00 (0.01)	7.9%	0.80
Quarter 5–6	0.02	0.02	0.00 (0.01)	8.0%	0.85
Quarter 7–8	0.01	0.01	0.01 (0.01)	75%	0.44
Quarter 1–8	0.02	0.02	-0.00 (0.00)	<1%	0.98
Proportion of unique days covered by any congestive heart failure prescription+					
Baseline	0.46	0.44			
Quarter 1	0.60	0.56	0.02 (0.01)	2.9%	0.17
Quarter 2	0.59	0.54	0.02* (0.01)	4.1%	0.09
Quarter 3	0.57	0.53	0.02 (0.01)	3.5%	0.20
Quarter 4	0.55	0.52	0.01 (0.02)	2.0%	0.51
Quarter 5	0.54	0.50	0.01 (0.02)	2.0%	0.56
Quarter 6	0.54	0.50	0.02 (0.02)	3.3%	0.40
Quarter 7	0.52	0.49	0.01 (0.02)	2.1%	0.63
Quarter 8	0.51	0.48	0.01 (0.03)	2.0%	0.72
Quarter 1–2	0.59	0.55	0.02 (0.01)	3.2%	0.12
Quarter 3–4	0.56	0.53	0.01 (0.01)	2.7%	0.31
Quarter 5–6	0.54	0.51	0.01 (0.02)	2.6%	0.44
Quarter 7–8	0.52	0.49	0.01 (0.02)	1.7%	0.70
Quarter 1–8	0.58	0.55	0.01 (0.01)	2.5%	0.25
Outpatient visits to primary care physician or specialist+					
Baseline	3.2	3.0			
Quarter 1	3.8	3.3	0.33*** (0.12)	9.4%	<0.01
Quarter 2	3.1	3.0	-0.02 (0.12)	<1%	0.90
Quarter 3	2.9	2.7	-0.04 (0.14)	-1.3%	0.78
Quarter 4	2.7	2.6	-0.14 (0.14)	-5.1%	0.32
Quarter 5	2.7	2.5	0.04 (0.16)	1.7%	0.79
Quarter 6	2.7	2.4	0.09 (0.17)	3.4%	0.62
Quarter 7	2.4	2.4	-0.17 (0.18)	-6.5%	0.34
Quarter 8	0.03	0.02	-0.18* (0.10)	-87%	0.06
Quarter 1–2	3.5	3.1	0.15 (0.10)	4.6%	0.15
Quarter 3–4	2.8	2.7	-0.10 (0.12)	-3.6%	0.39
Quarter 5–6	2.7	2.4	0.08 (0.15)	3.0%	0.60
Quarter 7–8	1.4	1.3	-0.06 (0.13)	-4.3%	0.61
Quarter 1–8	3.2	3.0	0.05 (0.10)	1.7%	0.58

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date) and in each quarter of the follow-up period. 55,828 beneficiary-quarters are included. Evaluators excluded skilled nursing facility visits and skilled nursing facility days from this analysis because fewer than 2% of beneficiaries recorded any skilled nursing facility stays or skilled nursing facility days. All values of these variables were therefore 0.

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

+ Denotes one of five main outcomes

a Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

7. Cross-sectional regression models

Table D.7. Impact estimates using cross-sectional regression models

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Emergency department visits+					
Baseline	1.0	0.90			
Quarter 1	3.8	4.0	-0.15 (0.29)	-3.9%	0.59
Quarter 2	4.4	4.2	0.29 (0.43)	6.9%	0.51
Quarter 3	1.0	1.1	-0.07 (0.09)	-6.0%	0.46
Quarter 4	1.0	1.0	-0.01 (0.09)	<1%	0.94
Quarter 1–2	1.8	1.8	-0.00 (0.11)	<1%	0.98
Quarter 3–4	0.80	0.82	-0.02 (0.06)	-1.9%	0.80
Quarter 1–4	0.99	0.99	-0.00 (0.06)	<1%	0.95
Inpatient stays+					
Baseline	0.55	0.49			
Quarter 1	0.41	0.45	-0.04 (0.03)	-8.0%	0.27
Quarter 2	0.42	0.43	-0.01 (0.04)	-1.5%	0.87
Quarter 3	0.37	0.39	-0.01 (0.04)	-3.4%	0.72
Quarter 4	0.31	0.34	-0.02 (0.03)	-7.2%	0.48
Quarter 1–2	0.39	0.42	-0.03 (0.03)	-7.2%	0.26
Quarter 3–4	0.33	0.34	-0.01 (0.03)	-2.3%	0.78
Quarter 1–4	0.37	0.39	-0.02 (0.02)	-5.9%	0.31
Skilled nursing facility stays+					
Baseline	0.02	0.01			
Quarter 1	0.02	0.03	-0.01 (0.01)	-30%	0.19
Quarter 2	0.03	0.03	0.00 (0.01)	6.5%	0.83
Quarter 3	0.03	0.02	0.01 (0.01)	53%	0.24
Quarter 4	0.02	0.03	-0.01 (0.01)	-36%	0.21
Quarter 1–2	0.02	0.03	-0.00 (0.01)	-16%	0.48
Quarter 3–4	0.02	0.02	-0.00 (0.01)	<1%	1.00
Quarter 1–4	0.02	0.02	-0.00 (0.00)	-10%	0.58
Proportion of unique days covered by any congestive heart failure prescription+					
Baseline	0.52	0.47			
Quarter 1	0.61	0.58	0.03*** (0.01)	5.3%	<0.01
Quarter 2	0.60	0.56	0.04*** (0.01)	6.4%	<0.01
Quarter 3	0.58	0.55	0.03** (0.01)	5.6%	0.01
Quarter 4	0.55	0.54	0.02 (0.01)	2.9%	0.26
Quarter 1–2	0.61	0.57	0.03*** (0.01)	5.9%	<0.01
Quarter 3–4	0.56	0.54	0.02** (0.01)	4.4%	0.04
Quarter 1–4	0.59	0.56	0.03*** (0.01)	5.2%	<0.01
Outpatient visits to primary care physician or specialist+					
Baseline	3.6	3.2			
Quarter 1	4.2	3.7	0.49*** (0.14)	13%	<0.01

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Quarter 2	3.5	3.4	0.06 (0.13)	1.8%	0.64
Quarter 3	3.2	3.1	0.10 (0.14)	3.4%	0.46
Quarter 4	3.0	3.0	-0.07 (0.15)	-2.3%	0.64
Quarter 1–2	3.8	3.5	0.25** (0.11)	7.0%	0.02
Quarter 3–4	3.1	3.1	-0.00 (0.12)	<1%	0.97
Quarter 1–4	3.4	3.3	0.15 (0.10)	4.6%	0.12

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date) and in each quarter of the follow-up period. 31,768 beneficiary-quarters are included. Evaluators excluded skilled nursing facility visits and skilled nursing facility days from this analysis because fewer than 2% of beneficiaries recorded any skilled nursing facility stays or skilled nursing facility days. All values of these variables were therefore 0.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[+] Denotes one of five main outcomes

[a] Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

8. Pre-COVID time period

Table D.8. Impact estimates during the time period before the COVID-19 pandemic

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Emergency department visits+					
Baseline	1.0	1.0			
Quarter 1	0.86	0.86	0.02 (0.09)	2.4%	0.82
Quarter 2	0.86	0.82	0.06 (0.13)	7.7%	0.64
Quarter 3	0.89	0.67	0.24 (0.15)	36%	0.12
Quarter 4	1.1	0.57	0.50* (0.30)	91%	0.09
Quarter 1–2	0.89	0.87	0.04 (0.09)	4.2%	0.69
Quarter 3–4	0.98	0.64	0.35** (0.18)	56%	0.04
Quarter 1–4	1.0	0.86	0.14 (0.11)	16%	0.18
Inpatient stays+					
Baseline	0.57	0.53			
Quarter 1	0.45	0.43	0.00 (0.05)	<1%	0.98
Quarter 2	0.34	0.40	-0.08 (0.05)	-18%	0.16
Quarter 3	0.36	0.33	0.01 (0.07)	1.9%	0.93
Quarter 4	0.36	0.24	0.10 (0.08)	38%	0.23
Quarter 1–2	0.43	0.43	-0.02 (0.04)	-4.8%	0.62
Quarter 3–4	0.39	0.31	0.06 (0.06)	18%	0.34
Quarter 1–4	0.50	0.44	0.02 (0.04)	3.2%	0.73
Skilled nursing facility stays+					
Baseline	0.02	0.01			
Quarter 1	0.03	0.03	0.00 (0.01)	<1%	0.99
Quarter 2	0.04	0.02	0.02 (0.02)	125%	0.16
Quarter 3	0.01	0.02	-0.01 (0.01)	-51%	0.35
Quarter 4	0.00	0.05	-0.05** (0.02)	-100%	0.02
Quarter 1–2	0.03	0.02	0.01 (0.01)	30%	0.52
Quarter 3–4	0.01	0.03	-0.02** (0.01)	-74%	0.03
Quarter 1–4	0.03	0.02	-0.00 (0.01)	-1.1%	0.97
Proportion of unique days covered by any congestive heart failure prescription+					
Baseline	0.54	0.50			
Quarter 1	0.65	0.60	0.02 (0.02)	2.9%	0.28
Quarter 2	0.65	0.59	0.04 (0.02)	5.7%	0.10
Quarter 3	0.65	0.57	0.05* (0.03)	8.8%	0.05
Quarter 4	0.66	0.57	0.07* (0.04)	11%	0.08
Quarter 1–2	0.65	0.60	0.02 (0.02)	3.7%	0.16
Quarter 3–4	0.67	0.58	0.06** (0.03)	10%	0.03
Quarter 1–4	0.69	0.61	0.04** (0.02)	6.2%	0.02
Outpatient visits to primary care physician or specialist+					
Baseline	3.7	3.4			
Quarter 1	4.3	3.5	0.64*** (0.22)	17%	<0.01

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Quarter 2	3.5	3.2	0.18 (0.26)	5.4%	0.49
Quarter 3	3.3	2.9	0.22 (0.31)	7.2%	0.48
Quarter 4	3.4	2.8	0.44 (0.46)	15%	0.34
Quarter 1–2	4.0	3.4	0.43** (0.19)	12%	0.02
Quarter 3–4	3.4	2.9	0.31 (0.31)	9.9%	0.32
Quarter 1–4	4.2	3.4	0.49** (0.21)	13%	0.02

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date) and in each quarter of the follow-up period. 16,175 beneficiary-quarters are included. The analysis is restricted to beneficiaries enrolled at least 91 days before March 1, 2020, and is restricted to analysis periods that do not include days from March 2020 or later.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[+] Denotes one of five main outcomes

[a] Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

B. Subgroups

1.   Beneficiaries who completed the MTM program

Table D.9. Impact estimates for those who completed the MTM program, main (+) and supplementary outcome measures using main regression models

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Emergency department visits+					
Baseline	0.94	0.95			
Quarter 1	0.65	0.78	-0.11 (0.07)	-14%	0.13
Quarter 2	0.60	0.72	-0.10 (0.07)	-14%	0.18
Quarter 3	0.59	0.66	-0.05 (0.07)	-7.7%	0.50
Quarter 4	0.56	0.65	-0.07 (0.09)	-11%	0.42
Quarter 1–2	0.64	0.77	-0.10 (0.06)	-14%	0.12
Quarter 3–4	0.60	0.67	-0.04 (0.07)	-6.8%	0.56
Quarter 1–4	0.66	0.77	-0.10 (0.06)	-13%	0.12
Inpatient stays+					
Baseline	0.51	0.52			
Quarter 1	0.29	0.38	-0.08** (0.03)	-21%	0.02
Quarter 2	0.32	0.35	-0.02 (0.04)	-5.1%	0.67
Quarter 3	0.29	0.30	-0.01 (0.04)	-1.7%	0.90
Quarter 4	0.28	0.28	0.00 (0.04)	1.4%	0.93
Quarter 1–2	0.32	0.38	-0.05 (0.03)	-14%	0.14
Quarter 3–4	0.30	0.30	0.01 (0.04)	3.0%	0.82
Quarter 1–4	0.34	0.38	-0.04 (0.03)	-10%	0.25
Skilled nursing facility stays+					
Baseline	0.02	0.01			
Quarter 1	0.01	0.03	-0.02** (0.01)	-60%	0.05
Quarter 2	0.03	0.03	-0.00 (0.01)	-3.9%	0.91
Quarter 3	0.01	0.02	-0.01 (0.01)	-30%	0.48
Quarter 4	0.02	0.04	-0.02* (0.01)	-57%	0.08
Quarter 1–2	0.02	0.03	-0.01 (0.01)	-31%	0.23
Quarter 3–4	0.02	0.03	-0.01* (0.01)	-48%	0.07
Quarter 1–4	0.02	0.03	-0.01* (0.01)	-38%	0.10
Proportion of unique days covered by any congestive heart failure prescription+					
Baseline	0.52	0.49			
Quarter 1	0.64	0.59	0.02 (0.01)	2.7%	0.23
Quarter 2	0.62	0.57	0.02 (0.02)	3.9%	0.13
Quarter 3	0.60	0.56	0.02 (0.02)	3.3%	0.28
Quarter 4	0.60	0.55	0.02 (0.02)	4.1%	0.22
Quarter 1–2	0.63	0.59	0.02 (0.01)	3.0%	0.18
Quarter 3–4	0.60	0.55	0.02 (0.02)	4.0%	0.18
Quarter 1–4	0.62	0.58	0.02 (0.01)	2.8%	0.25

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	*p*-value
Outpatient visits to primary care physician or specialist+					
Baseline	3.6	3.4			
Quarter 1	4.1	3.4	0.50*** (0.18)	14%	<0.01
Quarter 2	3.1	3.0	-0.08 (0.17)	-2.4%	0.64
Quarter 3	2.9	2.8	-0.08 (0.18)	-2.6%	0.66
Quarter 4	2.6	2.8	-0.27 (0.18)	-9.4%	0.14
Quarter 1–2	3.6	3.3	0.18 (0.15)	5.4%	0.22
Quarter 3–4	2.8	2.8	-0.19 (0.16)	-6.4%	0.23
Quarter 1–4	3.4	3.1	0.01 (0.14)	<1%	0.95

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date), in each quarter of the follow-up period, each 6-month period in the follow-up period, and a full year of follow up. Negative binomial regression models used for count outcomes and ordinary least squares regressions for continuous measures. None of the models included fixed effects. Top-coded skilled nursing facility days variable used because of the influence of outliers on the non-top-coded version of the variable, resulting in unreasonable predicted means for the follow-up period. There were 461 enrolled beneficiaries and 2,132 matched comparison beneficiaries included in the analysis.

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

+ Denotes one of five main outcomes

a Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

2. Beneficiaries who did not complete the MTM program

Table D.10. Impact estimates for those who did not complete the MTM program, main (+) and supplementary outcome measures using main regression models

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Emergency department visits+					
Baseline	1.1	1.1			
Quarter 1	1.1	1.0	0.10 (0.12)	10%	0.39
Quarter 2	1.3	0.92	0.41** (0.17)	46%	0.02
Quarter 3	0.92	0.82	0.12 (0.15)	15%	0.42
Quarter 4	0.90	0.67	0.25 (0.16)	40%	0.11
Quarter 1–2	1.2	1.0	0.23* (0.13)	24%	0.07
Quarter 3–4	0.91	0.77	0.18 (0.13)	25%	0.18
Quarter 1–4	1.1	0.95	0.20* (0.11)	21%	0.09
Inpatient stays+					
Baseline	0.60	0.60			
Quarter 1	0.53	0.44	0.11* (0.06)	26%	0.05
Quarter 2	0.47	0.40	0.09 (0.06)	23%	0.16
Quarter 3	0.43	0.35	0.09 (0.06)	27%	0.13
Quarter 4	0.32	0.29	0.04 (0.05)	14%	0.43
Quarter 1–2	0.55	0.39	0.13** (0.05)	31%	0.01
Quarter 3–4	0.43	0.31	0.09* (0.06)	27%	0.09
Quarter 1–4	0.50	0.41	0.09** (0.04)	22%	0.03
Skilled nursing facility stays+					
Baseline	0.02	0.02			
Quarter 1	0.04	0.03	0.01 (0.02)	43%	0.47
Quarter 2	0.03	0.02	0.01 (0.02)	79%	0.34
Quarter 3	0.08	0.02	0.06** (0.03)	380%	0.04
Quarter 4	0.03	0.02	0.01 (0.01)	32%	0.65
Quarter 1–2	0.03	0.02	0.01 (0.01)	37%	0.42
Quarter 3–4	0.05	0.02	0.03* (0.02)	150%	0.08
Quarter 1–4	0.04	0.02	0.02 (0.01)	74%	0.13
Proportion of unique days covered by any congestive heart failure prescription+					
Baseline	0.52	0.49			
Quarter 1	0.62	0.58	0.01 (0.02)	1.4%	0.63
Quarter 2	0.61	0.57	0.01 (0.02)	2.3%	0.50
Quarter 3	0.61	0.57	0.01 (0.02)	1.7%	0.66
Quarter 4	0.57	0.57	-0.02 (0.03)	-4.0%	0.37
Quarter 1–2	0.61	0.57	0.01 (0.02)	2.1%	0.45
Quarter 3–4	0.59	0.57	-0.01 (0.02)	-1.1%	0.77
Quarter 1–4	0.60	0.57	0.00 (0.02)	<1%	0.86
Outpatient visits to primary care physician or specialist+					
Baseline	3.6	3.4			

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Quarter 1	3.9	3.6	0.22 (0.22)	6.0%	0.32
Quarter 2	3.7	3.3	0.22 (0.25)	6.4%	0.36
Quarter 3	3.4	3.0	0.19 (0.26)	6.0%	0.47
Quarter 4	3.2	2.9	0.17 (0.29)	5.4%	0.56
Quarter 1–2	3.9	3.5	0.20 (0.21)	5.4%	0.34
Quarter 3–4	3.3	3.0	0.12 (0.24)	3.6%	0.63
Quarter 1–4	3.7	3.3	0.18 (0.20)	5.0%	0.37

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date). in each quarter of the follow-up period, each 6-month period in the follow-up period, and a full year of follow up. Negative binomial regression models used for count outcomes and ordinary least squares regressions for continuous measures. None of the models included fixed effects. There were 322 enrolled beneficiaries and 1,453 matched comparison beneficiaries included in the analysis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[+] Denotes one of five main outcomes

[a] Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

3. Dually eligible beneficiaries

Table D.11. Impact estimates for dually eligible beneficiaries

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	*p*-value
Emergency department visits+					
Baseline	0.50	0.51			
Quarter 1	0.42	0.38	0.05 (0.07)	14%	0.44
Quarter 2	0.46	0.32	0.16 (0.11)	52%	0.14
Quarter 3	0.35	0.37	-0.01 (0.07)	-1.6%	0.94
Quarter 4	0.36	0.30	0.07 (0.09)	25%	0.42
Quarter 1–2	0.45	0.35	0.11 (0.08)	34%	0.16
Quarter 3–4	0.36	0.34	0.04 (0.08)	11%	0.64
Quarter 1–4	0.43	0.36	0.08 (0.08)	21%	0.34
Inpatient stays+					
Baseline	0.29	0.29			
Quarter 1	0.20	0.20	0.00 (0.03)	<1%	0.96
Quarter 2	0.19	0.17	0.02 (0.04)	14%	0.57
Quarter 3	0.18	0.17	0.02 (0.04)	14%	0.53
Quarter 4	0.16	0.14	0.02 (0.03)	13%	0.61
Quarter 1–2	0.20	0.19	0.02 (0.03)	9.1%	0.58
Quarter 3–4	0.17	0.16	0.02 (0.03)	10%	0.58
Quarter 1–4	0.20	0.19	0.01 (0.03)	7.7%	0.58
Skilled nursing facility stays+					
Baseline	0.03	0.03			
Quarter 1	0.01	0.06	-0.05*** (0.01)	-83%	<0.01
Quarter 2	0.03	0.04	-0.01 (0.02)	-23%	0.58
Quarter 3	0.06	0.04	0.02 (0.02)	59%	0.39
Quarter 4	0.04	0.05	-0.01 (0.02)	-17%	0.69
Quarter 1–2	0.02	0.05	-0.03*** (0.01)	-59%	<0.01
Quarter 3–4	0.05	0.04	0.00 (0.02)	7.7%	0.85
Quarter 1–4	0.03	0.05	-0.02* (0.01)	-39%	0.10
Proportion of unique days covered by any congestive heart failure prescription+					
Baseline	0.05	0.02			
Quarter 1	0.07	0.07	-0.03* (0.02)	-32%	0.07
Quarter 2	0.07	0.08	-0.03 (0.02)	-28%	0.15
Quarter 3	0.06	0.08	-0.04** (0.02)	-41%	0.04
Quarter 4	0.07	0.08	-0.03 (0.02)	-33%	0.14
Quarter 1–2	0.06	0.07	-0.03* (0.02)	-34%	0.06
Quarter 3–4	0.06	0.07	-0.04* (0.02)	-38%	0.07
Quarter 1–4	0.06	0.07	-0.04** (0.02)	-39%	0.02

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	*p*-value
Outpatient visits to primary care physician or specialist+					
Baseline	3.5	3.3			
Quarter 1	3.6	3.5	-0.07 (0.24)	-1.9%	0.77
Quarter 2	3.4	3.2	0.03 (0.26)	<1%	0.92
Quarter 3	2.9	2.8	-0.14 (0.25)	-4.8%	0.56
Quarter 4	2.4	2.6	-0.37 (0.24)	-13%	0.13
Quarter 1–2	3.5	3.4	-0.06 (0.22)	-1.6%	0.80
Quarter 3–4	2.6	2.7	-0.29 (0.22)	-9.9%	0.18
Quarter 1–4	3.3	3.2	-0.16 (0.21)	-4.7%	0.44

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date), in each quarter of the follow-up period, each 6-month period in the follow-up period, and a full year of follow up. Negative binomial regression models used for count outcomes and ordinary least squares regressions for continuous measures. None of the models included fixed effects. There were 226 enrolled beneficiaries and 1,095 matched comparison beneficiaries included in the analysis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

+ Denotes one of five main outcomes

a Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

4. Non-dually eligible beneficiaries

Table D.12. Impact estimates for non-dually eligible beneficiaries

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	*p*-value
Emergency department visits+					
Baseline	1.2	1.2			
Quarter 1	0.98	1.1	-0.09 (0.08)	-8.0%	0.29
Quarter 2	1.0	1.0	0.01 (0.09)	<1%	0.91
Quarter 3	0.87	0.88	0.02 (0.10)	1.8%	0.87
Quarter 4	0.81	0.82	0.01 (0.10)	1.4%	0.91
Quarter 1–2	1.0	1.1	-0.04 (0.07)	-3.4%	0.63
Quarter 3–4	0.86	0.87	0.03 (0.09)	3.6%	0.73
Quarter 1–4	1.00	1.0	-0.02 (0.06)	-2.4%	0.70
Inpatient stays+					
Baseline	0.65	0.66			
Quarter 1	0.47	0.49	-0.01 (0.04)	-2.7%	0.75
Quarter 2	0.47	0.46	0.02 (0.05)	4.2%	0.69
Quarter 3	0.41	0.39	0.03 (0.05)	8.3%	0.49
Quarter 4	0.36	0.35	0.02 (0.05)	4.8%	0.73
Quarter 1–2	0.50	0.47	0.00 (0.04)	<1%	0.92
Quarter 3–4	0.43	0.37	0.04 (0.04)	10%	0.36
Quarter 1–4	0.48	0.47	0.01 (0.03)	1.9%	0.80
Skilled nursing facility stays+					
Baseline	0.01	0.01			
Quarter 1	0.03	0.01	0.01 (0.01)	80%	0.21
Quarter 2	0.03	0.02	0.01 (0.01)	52%	0.30
Quarter 3	0.02	0.01	0.01 (0.01)	109%	0.29
Quarter 4	0.01	0.03	-0.01 (0.01)	-55%	0.15
Quarter 1–2	0.03	0.02	0.01 (0.01)	63%	0.18
Quarter 3–4	0.02	0.02	-0.00 (0.01)	-6.6%	0.88
Quarter 1–4	0.02	0.02	0.01 (0.01)	41%	0.29
Proportion of unique days covered by any congestive heart failure prescription+					
Baseline	0.71	0.68			
Quarter 1	0.87	0.81	0.03** (0.01)	4.1%	0.01
Quarter 2	0.85	0.79	0.04*** (0.02)	5.3%	<0.01
Quarter 3	0.84	0.77	0.04** (0.02)	5.6%	0.01
Quarter 4	0.81	0.76	0.03 (0.02)	3.3%	0.20
Quarter 1–2	0.86	0.80	0.04*** (0.01)	4.6%	<0.01
Quarter 3–4	0.82	0.76	0.04** (0.02)	4.5%	0.04
Quarter 1–4	0.84	0.78	0.03** (0.01)	4.0%	0.02

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Outpatient visits to primary care physician or specialist+					
Baseline	3.6	3.4			
Quarter 1	4.2	3.4	0.61*** (0.17)	17%	<0.01
Quarter 2	3.3	3.1	0.04 (0.16)	1.1%	0.83
Quarter 3	3.2	2.9	0.10 (0.19)	3.3%	0.58
Quarter 4	3.1	2.9	0.02 (0.20)	<1%	0.92
Quarter 1–2	3.8	3.3	0.30** (0.14)	8.6%	0.03
Quarter 3–4	3.2	2.9	0.02 (0.17)	<1%	0.89
Quarter 1–4	3.6	3.2	0.18 (0.14)	5.1%	0.19

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date), in each quarter of the follow-up period, each 6-month period in the follow-up period, and a full year of follow up. Negative binomial regression models used for count outcomes and ordinary least squares regressions for continuous measures. None of the models included fixed effects. There were 557 enrolled beneficiaries and 2,490 matched comparison beneficiaries included in the analysis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

+ Denotes one of five main outcomes

a Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

5. White, non-Hispanic beneficiaries

Table D.13. Impact estimates for White, non-Hispanic beneficiaries

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	*p*-value
Emergency department visits+					
Baseline	0.81	0.82			
Quarter 1	0.70	0.68	0.03 (0.11)	4.5%	0.79
Quarter 2	0.84	0.59	0.27 (0.19)	47%	0.16
Quarter 3	0.66	0.56	0.12 (0.17)	22%	0.49
Quarter 4	0.53	0.48	0.07 (0.16)	15%	0.67
Quarter 1–2	0.75	0.65	0.12 (0.13)	19%	0.34
Quarter 3–4	0.60	0.54	0.09 (0.15)	18%	0.56
Quarter 1–4	0.70	0.64	0.08 (0.13)	13%	0.54
Inpatient stays+					
Baseline	0.47	0.47			
Quarter 1	0.32	0.34	-0.02 (0.06)	-4.6%	0.79
Quarter 2	0.32	0.27	0.06 (0.06)	22%	0.36
Quarter 3	0.26	0.27	-0.00 (0.06)	<1%	0.97
Quarter 4	0.19	0.23	-0.03 (0.05)	-15%	0.51
Quarter 1–2	0.35	0.31	0.01 (0.06)	2.1%	0.90
Quarter 3–4	0.26	0.26	-0.03 (0.05)	-8.9%	0.63
Quarter 1–4	0.31	0.32	-0.01 (0.05)	-3.0%	0.84
Skilled nursing facility stays+					
Baseline	0.03	0.02			
Quarter 1	0.02	0.05	-0.03* (0.02)	-60%	0.10
Quarter 2	0.03	0.04	-0.01 (0.02)	-22%	0.70
Quarter 3	0.01	0.03	-0.02* (0.01)	-71%	0.09
Quarter 4	0.02	0.02	-0.01 (0.01)	-33%	0.53
Quarter 1–2	0.02	0.04	-0.02 (0.01)	-45%	0.15
Quarter 3–4	0.01	0.03	-0.02 (0.01)	-55%	0.18
Quarter 1–4	0.02	0.03	-0.02 (0.01)	-47%	0.12
Proportion of unique days covered by any congestive heart failure prescription+					
Baseline	0.47	0.44			
Quarter 1	0.58	0.55	0.00 (0.02)	<1%	0.98
Quarter 2	0.57	0.54	0.01 (0.02)	2.0%	0.62
Quarter 3	0.59	0.53	0.04 (0.03)	7.3%	0.11
Quarter 4	0.56	0.53	0.01 (0.03)	2.4%	0.62
Quarter 1–2	0.57	0.55	0.00 (0.02)	<1%	0.87
Quarter 3–4	0.58	0.53	0.03 (0.02)	5.2%	0.23
Quarter 1–4	0.58	0.54	0.00 (0.02)	<1%	0.86

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Outpatient visits to primary care physician or specialist+					
Baseline	3.5	3.3			
Quarter 1	4.1	3.2	0.69** (0.27)	20%	0.01
Quarter 2	3.5	3.1	0.27 (0.33)	8.2%	0.42
Quarter 3	3.1	2.7	0.23 (0.30)	8.0%	0.43
Quarter 4	2.8	2.7	-0.02 (0.32)	<1%	0.95
Quarter 1–2	3.8	3.2	0.45* (0.26)	13%	0.08
Quarter 3–4	3.0	2.7	0.08 (0.27)	2.7%	0.77
Quarter 1–4	3.6	3.1	0.29 (0.24)	8.6%	0.23

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date) and in each quarter of the follow-up period, each 6-month period in the follow-up period, and a full year of follow up. Negative binomial regression models used for count outcomes and ordinary least squares regressions for continuous measures. None of the models included fixed effects. There were 197 enrolled beneficiaries and 994 matched comparison beneficiaries included in the analysis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

+ Denotes one of five main outcomes

a Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

6. Non-White and/or Hispanic beneficiaries

Table D.14. Impact estimates for non-White and/or Hispanic beneficiaries

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	*p*-value
Emergency department visits+					
Baseline	1.1	1.1			
Quarter 1	0.86	0.94	-0.05 (0.07)	-6.0%	0.44
Quarter 2	0.86	0.88	0.01 (0.07)	<1%	0.94
Quarter 3	0.73	0.79	-0.04 (0.07)	-4.7%	0.61
Quarter 4	0.73	0.72	0.03 (0.08)	4.3%	0.72
Quarter 1–2	0.88	0.94	-0.02 (0.06)	-1.9%	0.79
Quarter 3–4	0.75	0.77	0.01 (0.07)	1.8%	0.85
Quarter 1–4	0.88	0.91	-0.01 (0.06)	-1.7%	0.79
Inpatient stays+					
Baseline	0.58	0.58			
Quarter 1	0.41	0.42	-0.00 (0.03)	-1.2%	0.89
Quarter 2	0.40	0.40	0.01 (0.04)	1.8%	0.86
Quarter 3	0.37	0.34	0.04 (0.04)	12%	0.31
Quarter 4	0.33	0.31	0.04 (0.04)	12%	0.38
Quarter 1–2	0.43	0.41	-0.00 (0.03)	<1%	1.00
Quarter 3–4	0.39	0.33	0.05 (0.04)	13%	0.24
Quarter 1–4	0.43	0.42	0.02 (0.03)	4.4%	0.55
Skilled nursing facility stays+					
Baseline	0.01	0.01			
Quarter 1	0.02	0.02	0.00 (0.01)	15%	0.74
Quarter 2	0.03	0.02	0.01 (0.01)	40%	0.37
Quarter 3	0.04	0.02	0.03* (0.02)	174%	0.08
Quarter 4	0.02	0.04	-0.01 (0.01)	-39%	0.25
Quarter 1–2	0.03	0.02	0.00 (0.01)	18%	0.61
Quarter 3–4	0.03	0.02	0.01 (0.01)	21%	0.59
Quarter 1–4	0.03	0.02	0.00 (0.01)	18%	0.57
Proportion of unique days covered by any congestive heart failure prescription+					
Baseline	0.54	0.51			
Quarter 1	0.64	0.60	0.02 (0.01)	3.0%	0.15
Quarter 2	0.63	0.59	0.02 (0.01)	3.8%	0.12
Quarter 3	0.61	0.57	0.01 (0.02)	1.2%	0.67
Quarter 4	0.60	0.57	0.00 (0.02)	<1%	0.88
Quarter 1–2	0.64	0.59	0.02* (0.01)	3.4%	0.09
Quarter 3–4	0.60	0.57	0.01 (0.02)	<1%	0.74
Quarter 1–4	0.63	0.59	0.01 (0.01)	2.4%	0.25

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Outpatient visits to primary care physician or specialist+					
Baseline	3.6	3.4			
Quarter 1	4.0	3.5	0.28* (0.16)	7.5%	0.08
Quarter 2	3.3	3.2	-0.04 (0.15)	-1.3%	0.76
Quarter 3	3.1	3.0	-0.06 (0.17)	-1.9%	0.73
Quarter 4	2.9	2.9	-0.15 (0.18)	-5.0%	0.42
Quarter 1–2	3.7	3.4	0.10 (0.14)	2.7%	0.48
Quarter 3–4	3.0	2.9	-0.14 (0.16)	-4.5%	0.37
Quarter 1–4	3.5	3.3	-0.01 (0.13)	<1%	0.96

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date), in each quarter of the follow-up period, each 6-month period in the follow-up period, and a full year of follow up. Negative binomial regression models used for count outcomes and ordinary least squares regressions for continuous measures. None of the models included fixed effects. There were 586 enrolled beneficiaries and 2,591 matched comparison beneficiaries included in the analysis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

+ Denotes one of five main outcomes

a Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

7. **Beneficiaries with Chronic Illness and Disability Payment System scores above the median**

Table D.15. Impact estimates for beneficiaries with Chronic Illness and Disability Payment System scores above the median

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Emergency department visits+					
Baseline	1.2	1.3			
Quarter 1	1.0	1.2	-0.11 (0.10)	-9.7%	0.24
Quarter 2	1.1	1.0	0.05 (0.11)	5.2%	0.64
Quarter 3	0.91	0.91	0.03 (0.10)	3.4%	0.77
Quarter 4	0.89	0.87	0.05 (0.13)	5.9%	0.70
Quarter 1–2	1.1	1.2	-0.03 (0.09)	-2.4%	0.77
Quarter 3–4	0.93	0.91	0.06 (0.10)	6.9%	0.56
Quarter 1–4	1.1	1.1	-0.00 (0.08)	<1%	0.96
Inpatient stays+					
Baseline	0.69	0.70			
Quarter 1	0.54	0.55	0.01 (0.05)	1.8%	0.84
Quarter 2	0.49	0.49	0.00 (0.05)	<1%	0.93
Quarter 3	0.47	0.41	0.07 (0.05)	17%	0.20
Quarter 4	0.43	0.38	0.06 (0.05)	15%	0.31
Quarter 1–2	0.53	0.53	0.01 (0.04)	2.5%	0.77
Quarter 3–4	0.47	0.41	0.08 (0.05)	19%	0.11
Quarter 1–4	0.55	0.52	0.03 (0.04)	5.7%	0.48
Skilled nursing facility stays+					
Baseline	0.02	0.02			
Quarter 1	0.03	0.04	-0.01 (0.01)	-15%	0.66
Quarter 2	0.05	0.03	0.02 (0.02)	69%	0.16
Quarter 3	0.06	0.03	0.03 (0.02)	92%	0.21
Quarter 4	0.02	0.06	-0.03* (0.02)	-57%	0.06
Quarter 1–2	0.04	0.03	0.00 (0.01)	9.3%	0.76
Quarter 3–4	0.04	0.04	-0.00 (0.01)	-6.0%	0.85
Quarter 1–4	0.04	0.03	0.00 (0.01)	2.1%	0.93
Proportion of unique days covered by any congestive heart failure prescription+					
Baseline	0.53	0.50			
Quarter 1	0.60	0.59	-0.01 (0.01)	-1.7%	0.49
Quarter 2	0.60	0.58	-0.00 (0.02)	<1%	0.98
Quarter 3	0.58	0.56	-0.01 (0.02)	-1.7%	0.60
Quarter 4	0.57	0.56	-0.02 (0.02)	-2.7%	0.44
Quarter 1–2	0.60	0.58	-0.00 (0.01)	<1%	0.79
Quarter 3–4	0.58	0.56	-0.01 (0.02)	-1.7%	0.57
Quarter 1–4	0.60	0.58	-0.01 (0.01)	-1.3%	0.59

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	*p*-value
Outpatient visits to primary care physician or specialist+					
Baseline	4.1	3.9			
Quarter 1	4.6	4.2	0.19 (0.20)	4.4%	0.33
Quarter 2	3.8	3.9	-0.26 (0.21)	-6.5%	0.21
Quarter 3	3.7	3.5	0.03 (0.22)	<1%	0.88
Quarter 4	3.4	3.4	-0.18 (0.24)	-5.0%	0.45
Quarter 1–2	4.2	4.1	-0.05 (0.17)	-1.3%	0.76
Quarter 3–4	3.6	3.5	-0.12 (0.20)	-3.4%	0.53
Quarter 1–4	4.1	3.9	-0.08 (0.17)	-2.0%	0.63

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date), in each quarter of the follow-up period, each 6-month period in the follow-up period, and a full year of follow up. Negative binomial regression models used for count outcomes and ordinary least squares regressions for continuous measures. None of the models included fixed effects. There were 445 enrolled beneficiaries and 1,903 matched comparison beneficiaries included in the analysis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

+ Denotes one of five main outcomes

a Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

8. **Beneficiaries with Chronic Illness and Disability Payment System scores below the median**

Table D.16. Impact estimates for beneficiaries with Chronic Illness and Disability Payment System scores below the median

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Emergency department visits+					
Baseline	0.69	0.70			
Quarter 1	0.52	0.49	0.04 (0.07)	8.6%	0.56
Quarter 2	0.57	0.50	0.09 (0.08)	19%	0.26
Quarter 3	0.46	0.48	-0.01 (0.09)	-2.9%	0.88
Quarter 4	0.41	0.40	0.02 (0.08)	6.3%	0.75
Quarter 1–2	0.55	0.50	0.06 (0.07)	13%	0.35
Quarter 3–4	0.44	0.46	0.00 (0.08)	<1%	0.96
Quarter 1–4	0.52	0.51	0.02 (0.07)	3.8%	0.77
Inpatient stays+					
Baseline	0.36	0.36			
Quarter 1	0.19	0.22	-0.03 (0.03)	-14%	0.34
Quarter 2	0.24	0.21	0.04 (0.04)	18%	0.36
Quarter 3	0.18	0.20	-0.01 (0.04)	-6.5%	0.73
Quarter 4	0.13	0.17	-0.03 (0.04)	-17%	0.44
Quarter 1–2	0.22	0.22	0.00 (0.03)	<1%	0.97
Quarter 3–4	0.17	0.19	-0.02 (0.03)	-11%	0.55
Quarter 1–4	0.21	0.23	-0.02 (0.03)	-6.8%	0.59
Skilled nursing facility stays+					
Baseline	0.01	0.01			
Quarter 1	0.01	0.01	-0.00 (0.01)	-25%	0.64
Quarter 2	0.00	0.01	-0.01** (0.01)	-79%	0.03
Quarter 3	0.01	0.01	0.00 (0.01)	41%	0.69
Quarter 4	0.01	0.01	0.01 (0.01)	124%	0.35
Quarter 1–2	0.01	0.01	-0.01 (0.01)	-53%	0.13
Quarter 3–4	0.01	0.01	0.00 (0.01)	68%	0.45
Quarter 1–4	0.01	0.01	-0.00 (0.00)	-22%	0.59
Proportion of unique days covered by any congestive heart failure prescription+					
Baseline	0.51	0.48			
Quarter 1	0.66	0.59	0.05*** (0.02)	7.3%	<0.01
Quarter 2	0.64	0.57	0.05** (0.02)	7.7%	0.01
Quarter 3	0.63	0.56	0.05** (0.02)	8.0%	0.02
Quarter 4	0.61	0.56	0.03 (0.02)	5.7%	0.15
Quarter 1–2	0.65	0.58	0.04*** (0.02)	7.1%	<0.01
Quarter 3–4	0.62	0.56	0.04* (0.02)	6.6%	0.06
Quarter 1–4	0.64	0.58	0.04** (0.02)	6.1%	0.02

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Outpatient visits to primary care physician or specialist+					
Baseline	2.9	2.7			
Quarter 1	3.3	2.6	0.55*** (0.18)	20%	<0.01
Quarter 2	2.7	2.3	0.30* (0.17)	12%	0.07
Quarter 3	2.3	2.2	-0.01 (0.19)	<1%	0.97
Quarter 4	2.2	2.1	-0.07 (0.19)	-3.3%	0.70
Quarter 1–2	3.0	2.5	0.41*** (0.16)	16%	<0.01
Quarter 3–4	2.3	2.2	-0.05 (0.17)	-2.2%	0.77
Quarter 1–4	2.8	2.4	0.21 (0.15)	8.1%	0.15

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date), in each quarter of the follow-up period, each 6-month period in the follow-up period, and a full year of follow up. Negative binomial regression models used for count outcomes and ordinary least squares regressions for continuous measures. None of the models included fixed effects. There were 338 enrolled beneficiaries and 1,682 matched comparison beneficiaries included in the analysis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

+ Denotes one of five main outcomes

a Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

9. Beneficiaries with diagnoses targeted by the expanded MTM program

Table D.17. Impact estimates for beneficiaries with diagnoses targeted by the expanded MTM program

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	*p*-value
Emergency department visits+					
Baseline	1.0	1.1			
Quarter 1	0.87	0.95	-0.06 (0.07)	-6.7%	0.37
Quarter 2	0.91	0.87	0.06 (0.09)	7.4%	0.47
Quarter 3	0.81	0.77	0.07 (0.09)	9.0%	0.44
Quarter 4	0.74	0.74	0.03 (0.09)	4.2%	0.75
Quarter 1–2	0.90	0.94	-0.01 (0.07)	-1.1%	0.88
Quarter 3–4	0.80	0.77	0.06 (0.08)	7.8%	0.47
Quarter 1–4	0.89	0.91	-0.00 (0.06)	<1%	0.97
Inpatient stays+					
Baseline	0.59	0.59			
Quarter 1	0.43	0.45	-0.01 (0.04)	-2.7%	0.74
Quarter 2	0.40	0.41	-0.00 (0.04)	-1.2%	0.91
Quarter 3	0.39	0.36	0.04 (0.04)	11%	0.34
Quarter 4	0.33	0.34	-0.00 (0.04)	<1%	0.94
Quarter 1–2	0.43	0.44	-0.00 (0.03)	<1%	0.90
Quarter 3–4	0.38	0.36	0.03 (0.04)	8.7%	0.40
Quarter 1–4	0.44	0.44	0.00 (0.03)	<1%	1.00
Skilled nursing facility stays+					
Baseline	0.02	0.02			
Quarter 1	0.02	0.03	-0.01 (0.01)	-23%	0.45
Quarter 2	0.03	0.03	0.01 (0.01)	23%	0.56
Quarter 3	0.04	0.02	0.02 (0.01)	84%	0.21
Quarter 4	0.02	0.04	-0.02* (0.01)	-55%	0.07
Quarter 1–2	0.03	0.03	-0.00 (0.01)	-8.7%	0.74
Quarter 3–4	0.03	0.03	-0.00 (0.01)	-6.8%	0.83
Quarter 1–4	0.03	0.03	-0.00 (0.01)	-8.3%	0.73
Proportion of unique days covered by any congestive heart failure prescription+					
Baseline	0.52	0.50			
Quarter 1	0.61	0.59	-0.00 (0.01)	<1%	0.87
Quarter 2	0.61	0.57	0.01 (0.01)	2.0%	0.40
Quarter 3	0.60	0.57	0.00 (0.02)	<1%	0.78
Quarter 4	0.58	0.55	0.00 (0.02)	<1%	0.94
Quarter 1–2	0.61	0.58	0.00 (0.01)	<1%	0.78
Quarter 3–4	0.59	0.56	0.00 (0.02)	<1%	0.86
Quarter 1–4	0.60	0.57	0.00 (0.01)	<1%	0.99
Outpatient visits to primary care physician or specialist+					
Baseline	3.8	3.6			
Quarter 1	4.2	3.7	0.24 (0.15)	6.2%	0.10

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Quarter 2	3.6	3.4	-0.05 (0.16)	-1.3%	0.77
Quarter 3	3.4	3.1	0.10 (0.17)	3.0%	0.57
Quarter 4	3.1	3.1	-0.14 (0.19)	-4.2%	0.47
Quarter 1–2	3.9	3.6	0.06 (0.13)	1.7%	0.63
Quarter 3–4	3.3	3.1	-0.06 (0.16)	-1.7%	0.72
Quarter 1–4	3.7	3.5	0.01 (0.13)	<1%	0.96

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date), in each quarter of the follow-up period, each 6-month period in the follow-up period, and a full year of follow up. Negative binomial regression models used for count outcomes and ordinary least squares regressions for continuous measures. None of the models included fixed effects. There were 612 enrolled beneficiaries and 2,756 matched comparison beneficiaries included in the analysis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[+] Denotes one of five main outcomes

[a] Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

10. Beneficiaries without diagnoses targeted by the expanded MTM program

Table D.18. Impact estimates for beneficiaries without diagnoses targeted by the expanded MTM program

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Emergency department visits+					
Baseline	0.85	0.87			
Quarter 1	0.64	0.59	0.06 (0.11)	11%	0.57
Quarter 2	0.67	0.56	0.12 (0.12)	23%	0.29
Quarter 3	0.39	0.57	-0.16 (0.11)	-30%	0.12
Quarter 4	0.45	0.40	0.07 (0.10)	19%	0.47
Quarter 1–2	0.68	0.59	0.12 (0.11)	21%	0.26
Quarter 3–4	0.43	0.50	-0.04 (0.09)	-8.8%	0.64
Quarter 1–4	0.63	0.59	0.05 (0.09)	9.2%	0.54
Inpatient stays+					
Baseline	0.41	0.41			
Quarter 1	0.24	0.24	0.00 (0.05)	1.5%	0.94
Quarter 2	0.31	0.22	0.10 (0.07)	49%	0.12
Quarter 3	0.18	0.18	0.00 (0.05)	1.0%	0.97
Quarter 4	0.19	0.12	0.08* (0.04)	69%	0.09
Quarter 1–2	0.30	0.23	0.04 (0.05)	17%	0.40
Quarter 3–4	0.21	0.15	0.03 (0.04)	17%	0.47
Quarter 1–4	0.26	0.22	0.04 (0.04)	21%	0.25
Skilled nursing facility stays+					
Baseline	0.01	0.01			
Quarter 1	0.01	0.01	0.00 (0.01)	21%	0.82
Quarter 2	0.02	0.02	-0.00 (0.01)	<1%	0.99
Quarter 3	0.02	0.01	0.01 (0.02)	74%	0.57
Quarter 4	0.03	0.01	0.02 (0.02)	118%	0.37
Quarter 1–2	0.02	0.01	0.00 (0.01)	6.5%	0.90
Quarter 3–4	0.03	0.02	0.01 (0.02)	53%	0.57
Quarter 1–4	0.02	0.02	0.00 (0.01)	22%	0.69
Proportion of unique days covered by any congestive heart failure prescription+					
Baseline	0.51	0.48			
Quarter 1	0.68	0.59	0.07*** (0.03)	11%	<0.01
Quarter 2	0.65	0.57	0.05* (0.03)	7.9%	0.09
Quarter 3	0.63	0.55	0.05* (0.03)	9.0%	0.09
Quarter 4	0.62	0.57	0.02 (0.04)	3.9%	0.53
Quarter 1–2	0.67	0.59	0.06*** (0.02)	10%	<0.01
Quarter 3–4	0.63	0.56	0.04 (0.03)	7.1%	0.18
Quarter 1–4	0.67	0.59	0.05** (0.02)	8.5%	0.03
Outpatient visits to primary care physician or specialist+					
Baseline	2.8	2.6			
Quarter 1	3.4	2.5	0.77*** (0.26)	29%	<0.01

	Treatment group mean	Comparison group mean	Impact estimate (SE)	Percent impact[a]	p-value
Quarter 2	2.6	2.2	0.25 (0.22)	11%	0.26
Quarter 3	2.0	2.1	-0.21 (0.23)	-9.7%	0.36
Quarter 4	2.1	2.0	-0.07 (0.26)	-3.4%	0.79
Quarter 1–2	3.1	2.4	0.53** (0.21)	21%	0.01
Quarter 3–4	2.0	2.0	-0.16 (0.20)	-7.1%	0.43
Quarter 1–4	2.7	2.3	0.25 (0.18)	10%	0.17

Note: Table shows regression-adjusted treatment and comparison group mean utilization in baseline period (four quarters prior to MTM meal start date or pseudo start date), in each quarter of the follow-up period, each 6-month period in the follow-up period, and a full year of follow up. Negative binomial regression models used for count outcomes and ordinary least squares regressions for continuous measures. None of the models included fixed effects. There were 171 enrolled beneficiaries and 829 matched comparison beneficiaries included in the analysis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[+] Denotes one of five main outcomes

[a] Percent impact is relative to a counterfactual value defined as the treatment mean minus the impact estimate.

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The Medically Tailored Meals Pilot Program Evaluation Report is posted on line on the DHCS website: https://www.dhcs.ca.gov/formsandpubs/Pages/Reports-to-the-Legislature.aspx