

FoodMap NY

Leveraging Private-Sector Innovation
and Investment for Food Security

FINAL PROJECT REPORT

Food as Medicine: Developing a Model for Private Sector Investment

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Center for
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Cornell
SC Johnson College of Business
CENTER FOR SUSTAINABLE GLOBAL ENTERPRISE

Food as Medicine: Developing a Model for Private Sector Investment

Starting around 2010, a movement that came to be known as Food as Medicine (FAM) began addressing food insecurity and diet-related health conditions for Americans nationwide by connecting patients to healthy food and nutritional supports by way of a referral or “prescription” from a healthcare provider.

A number of studies and reports by trusted names in research, policy and philanthropy, as well as the identification of FAM as a key strategy in the 2022 White House conference on Health and Hunger, point to a widespread momentum and belief in exploring and scaling these established models. The field is backed by multiple randomized clinical trials, many of which prove direct improvements on health outcomes, as well as cost savings and cost-efficiencies.



The Problem

FAM programs thus far have been primarily generated from the public and nonprofit sectors, and funded by Medicaid and Medicare – with research that largely considers the impact on federal spending and societal costs, including lost productivity and quality of life. Additionally, past evaluations have assessed single-participant impact and cost saving, despite likely family-level impacts.

While these are critical demographics to support with FAM interventions, diet-related health conditions and associated healthcare costs reach a much broader population. With the nation at large seeing unprecedented levels of diabetes, cardiovascular disease and food insecurity even amongst households not reliant on Medicaid, Medicare and SNAP, and direct healthcare costs associated with diet-related health conditions estimated at \$650 billion/year,¹ there is an opportunity for private insurers to address critical and widespread health conditions while also improving their bottom line.

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The Solution

Pilot a FAM program with a private insurance payer to test the business case for private sector adoption. FoodMap NY retained DAISA Enterprises,² an equity-focused consulting firm working at the intersection of food, culture and health, to develop a pilot that tests, through compelling and feasible quantitative and qualitative indicators, the feasibility of sustainable private sector support and engagement in an FAM approach.

Programmatic Design

Informed by a review and analysis of FAM programs and related research and evaluations to date, DAISA developed a high-level concept note for a private sector pilot.³ Specifically, the pilot program design includes the following:

1. An evaluation with a randomized controlled trial design, which is considered the gold standard of research. The study will utilize one control group and two intervention groups to explore nuances in the intervention design. Both intervention groups will receive one year of weekly fruit and vegetable (F&V)⁴ distributions, with the weekly quantity sufficient to meet the needs of the household rather than the individual. This approach addresses the identified shortcoming of much research to date in which the intervention and cost of FAM programming is analyzed on an individual level despite vast evidence that food is managed and shared at a household level.

One intervention group will receive the same amount of F&V each week throughout the one-year intervention period, while the other will receive a reduced quantity



Photo credit Julia Backus

after six months. In doing this, the pilot aims to assess whether dietary changes can be sustained with reduced provision after a six-month period or if a full year of full provision of F&V distribution is necessary to support participants in meeting specified health goals and outcomes. Both intervention groups will receive nutrition education, and the quantity/value of F&V will be based on findings from prior programs.



2. Three key partners: (1) an experienced food security-focused community-based organization (CBO) to implement the food distribution and nutrition education, (2) a private payer to identify participants and contribute to intervention costs, and (3) a large employer with lower-wage employees eligible for the program. Data collection tools and analysis plans will be designed in collaboration with the payer partner (for instance, their Product and Social Determinant of Health teams). Data collection will be undertaken by the CBO, employer, and payer to facilitate a robust evaluation. The pilot also includes additional key partners to facilitate the finalization of the pilot design and financial model, as well as conduct data collection and evaluation.
3. Eligible employees of the employer partners. Lower-income employees of the employer partner will be eligible to participate in the study if they are food insecure (as identified through a screening) and have uncontrolled diabetes ($A1c > 7.5$). Both of these are typical eligibility requirements for PRx studies, as these conditions are sensitive to F&V provision and dietary changes and resultantly present a greater likelihood for healthcare cost savings.
4. A 36-month timeline. The entire pilot, including the critical stage of final design with partner input and final report generation, will require 36 months.

Financial Model

Costs

To estimate the costs of the intervention, a detailed calculus of food and delivery provision costs was made based on the concept note assumptions.⁵ One of the intervention groups will have a constant quantity and dollar amount of food provided throughout the year, and the other group will have a lower quantity and corresponding dollar amount for months 7-12. Based on this, it was estimated that food and associated logistics would cost \$667,800.

One-third of the total budget allocated for the pilot program was applied to the total cost of food and delivery; this was based on DAISA's experience in providing technical assistance to organizations across the nation that implement FAM programs. Another third of the total budget is recommended to be budgeted for evaluation. This will allow the partners to facilitate a robust and rigorous evaluation of the program and disseminate the findings. The remaining third of the budget is allocated for program implementation and associated costs; this is based on prior experience with PRx programs and in recognition of the substantial efforts and contributions necessary to implement such a program, including CBO staff time, overhead and nutrition education.

Benefits

DAISA modeled the expected benefits of the program using the above inputs and expected outcomes based on prior evaluations of PRx programs.

Although we recognize the multiplicity of potential outcomes, two major outcomes were modeled: overall health care expenditure savings (which does not distinguish between urgent care and preventive medicine) and customer retention from the private insurance plan.

DAISA's public health advisor, Dr. Roopa Kalyanaraman Marcello, provided the research basis to calculate the first metric (health care expenditure savings), where we utilized data from several recent studies showing that adults and families with food insecurity have higher health care utilization and incur higher health care costs than adults and families who are food secure. One recent study parsed families' differences in health care expenditures by insurance type, finding that costs were higher by \$1,855 among families with public insurance, \$2,107 among those with private insurance, and \$3,531 among those with no insurance or a mix of different types of coverage (e.g., parents with private insurance and children with Medicaid).⁶ (Dr. Marcello's literature review and analysis is in Appendix D.)

Our model used the higher difference in health care expenditures incurred by families with private insurance, which was discounted by the following years' new costs once they became food secure as a result of receiving the intervention.

For the customer retention calculus, DAISA supports this analysis based on anecdotal information and identified interest in testing the intervention's retention impact by healthcare stakeholders interviewed.

DAISA simulated a 2% increase in retention for health care plan members who participate in the intervention compared to those not exposed to this kind of benefit. It also assumed a net margin value per family covered by private insurance of \$3,600 per year.

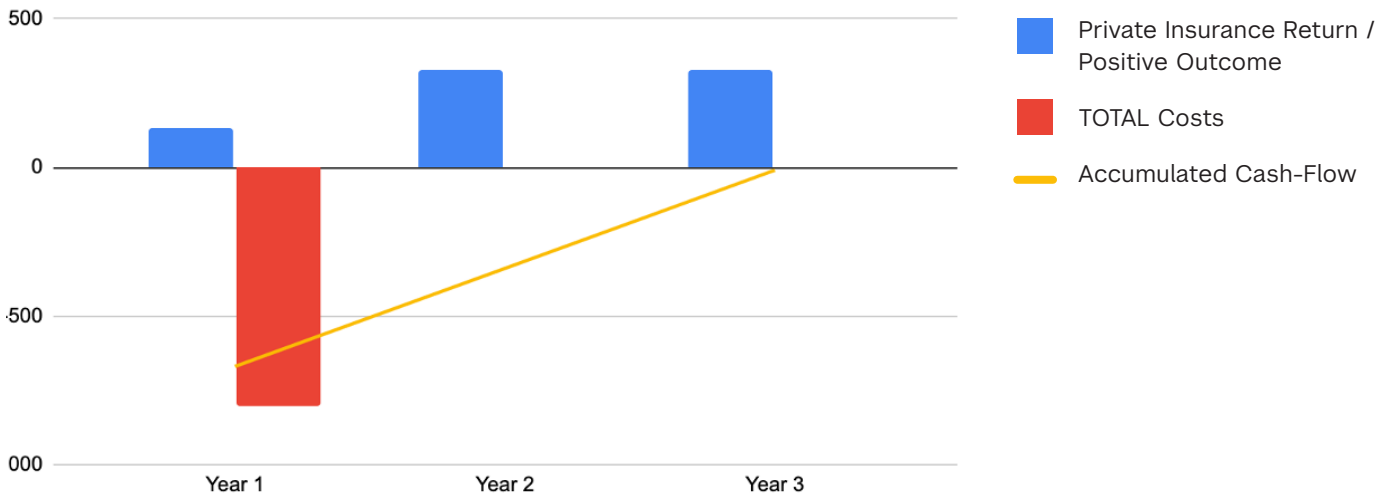


Multi-year simulation analysis

Other extrapolations were made to run a simple return over investment analysis or to find out how long the potential returns would offset the costs of the intervention. The main assumptions were:

- **Cost:** costs include Year 1 food and logistics, plus 20% of overhead (excludes pilot-only costs that are included in the Concept Note)
- **Benefits:** health care expenditure savings only occurs fully in Year 2 and Year 3 (Year 1 = 25%, Year 2: 100%, and Year 3: 100%)
- **Benefits:** customer retention only occurs at the highest rate (2%) occurring in Year 1 (Year 1 = 100%, Year 2 = 50%, Year 3 = 50%).
- The model is also set to simulate different co-payment scenarios, splitting the patient’s contribution from the total private insurance payment responsibility.

A graphic of the final analysis can be seen below:



Each benefit’s contribution to the total savings varies over time. The following table presents this analysis in the same 3-year timeframe.

	YEAR 1	YEAR 2	YEAR 3
% of Healthcare expenditure saving out of total saving	57%	91%	91%
% of Customer retention out of total saving	43%	9%	9%

The following table includes metrics identified through literature review and stakeholder conversations for both evaluation and the private payer financial model:

Table 1. - Input Considerations and Associated Potential Outcomes for a Produce Prescription intervention to a low-income employee base of patients

PRIVATE INSURER	EMPLOYER
<p>Input considerations for final financial model design:</p> <ul style="list-style-type: none"> • Cost changes associated with: <ul style="list-style-type: none"> - missed appointments, Emergency Department (ED) reduction, mental health costs - stress-level changes - other health-related social needs - improved health care engagement • Costs of all patient-oriented inputs above for others on the same household plan • Population considerations: high A1c, complex care patients • New clients: <ul style="list-style-type: none"> - Gain in new clients, gain in clients who value healthy food - Cost of acquisition of new clients 	<p>Input considerations for final financial model design:</p> <ul style="list-style-type: none"> • Change in number of sick days (absent) • Change in workplace dynamics • Change in employee retention • Change in cost of health insurance plan • Attraction to new staff members
<p>Possible outcomes:</p> <ul style="list-style-type: none"> • Reduced costs associated with responsive care and increased costs associated with preventative primary care • Increased retention • Possible strategies for continuous benefit: billable service vs wellness benefit, sharing of costs 	<p>Possible outcomes:</p> <ul style="list-style-type: none"> • Improved productivity and morale • Improved retention of employees • High-quality applicants for open positions • Possible strategies for continuous benefit: sharing of costs

Stakeholder engagement

Once the Concept Note was developed in October of 2023, three New York State regions/cities were considered for the intervention based on identified local leadership and partnerships.

Buffalo emerged as the community with the most potential given FoodMap’s timeline. Buffalo Go Green showed strong connections and capacity to activate its network on short notice. Leadership with the prospective private insurance partner and employer partner – Highmark BCBS and Kaleida Health – quickly expressed support and moved conversations forward inside their organizations. Buffalo Go Green leadership also demonstrated a high level of vision and operational

commitment to making this intervention happen. "We don't just want to engage in regular Food as Medicine interventions; we want to engage in Food as Medicine projects that can be field game changers, as the one you are presenting to us," said Allison DeHoney, Buffalo Go Green founder and CEO.

Buffalo Go Green also wants to leverage the relationships of their previous projects by working with Cornell University as an evaluator of the program. This helps close the loop of another key stakeholder that is needed to be part of a full project design.

DAISA moved forward in developing the Buffalo opportunity. All the collaborators of this proposal – Buffalo Go Green, Highmark Blue Cross Blue Shield Western New York, Kaleida Health, DAISA, and NYU—signed a Memorandum of Understanding (MoU), formally committing to support the fundraising and the implementation of this initiative.

Impact

Unlike almost all FAM research to date, this pilot specifically aims to bring a private insurer and employer to the table to design the evaluation and identify key metrics and outcomes of interest in order to define the business case. This pilot will answer a new set of questions for the private sector:

- Is a PRx benefit for a low-income, employed population a cost-effective or cost-saving intervention for a private insurer and employer?
- How does this type of PRx generate cost savings, and for whom - through behavior changes, clinical health outcomes, avoided expenses, participant engagement, and retention?
- Is there a cost-sharing breakdown that should be subsequently modeled to test an ongoing intervention?
 - Private insurance participation (% of the total provision of healthy food)
 - Employer co-payment
 - Employee co-payment

This pilot has the potential to unlock millions, if not billions, of dollars, given the health costs associated with poor nutrition.



Collaborators

Collaborators include:

- **Buffalo Go Green**, a community based nonprofit organization working to address food insecurity and health equity in Buffalo, NY.
- **Highmark Blue Cross Blue Shield Western New York**, which provides third party administrative services to the Kaleida Health self-funded employee welfare benefit plan for employees of Kaleida Health and their respective dependents.
- **Kaleida Health**, the largest healthcare provider in Western New York, serving an eight county area and the Plan Sponsor of the Kaleida Health self-funded employee welfare benefit plan.
- **DAISA Enterprises**, an equity-focused consulting firm working at the intersection of food, culture and health with deep experience with FAM programs.
- **New York University Stern School of Business Center for Sustainable Business**, an academic center dedicated to advancing sustainable business practices.

As of this publication, all parties have signed a Memorandum of Understanding (MoU) formally committing to support the fundraising and the implementation of this initiative.

Next Steps

Funding from the Mother Cabrini Health Foundation for FoodMap NY was crucial to developing the program design, financial model, and key partners for an effective pilot. The next step –funding this pilot project–presents an opportunity for philanthropic capital to de-risk private sector investment, enabling private sector payers to invest more confidently in the future.

The Food as Medicine intervention proposed here is based on the knowledge and network built over the last year. No longer theoretical, the intervention enjoys the support of key stakeholders. Assuming final acceptance and support from a major private insurer in Western New York, which has headquarters and branches in other states, a fundamental mindset shift could be achieved. This shift has the potential to unlock millions, if not billions, of dollars, given the health costs associated with poor nutrition.

Moreover, based on support from this private insurer and a major hospital in the same region, DAISA is confident that other philanthropists, such as the Rockefeller Foundation and funders focused on food and health, can be approached to secure the necessary resources for Phase 2 of the project.

Buffalo Go Green has been invited to submit a full proposal to the Mother Cabrini Health Foundation in June 2024 for a two-year project. The Food as Medicine team is confident that Buffalo Go Green will be successful with this proposal.

ACKNOWLEDGMENTS

DAISA Team:

- **Gustavo Mamao**, *Impact Investing Director and Project Leader*
- **Rochelle Bellin**, *Senior Manager of Food Systems Strategies and Partnerships*
- **Daniel Ross**, *CEO*
- **Maria Elena Rodriguez**, *Director of Research & Community Partnerships*
- **Roopa Kalyanaraman Marcello**, *DAISA Public Health Advisor*

DAISA also relied on NYU Stern graduate researcher Mohamed Nazer, who provided support in the development of the Financial-Impact model.

Our thanks to all affiliated employees and collaborators of the interviewed and engaged organizations throughout the process of this work:

- **Community-based organizations:** Buffalo Go Green, Foodlink NY, The Rural Health Network of South Central New York, and Capital Roots.
- **Healthcare related organizations:** Bassett Healthcare, MVP Health, St. Joseph's Hospital Health Center, Kaleida Health, and Highmark Blue Cross Blue Shield of Western New York.
- **Others:** NYS Food as Medicine Project / Food is Medicine Coalition, Cornell University, American Federation of State, County, and Municipal Employees (AFSCME), and EatWell.

List of Stakeholders

CONTACT(S)	COMPANY
Allison DeHoney	Buffalo Go Green
Amy Klein	Capital Roots
Camille Verbofsky	Foodlink NY
Christopher Owens	St. Joseph's Hospital Health Center
Dan Wexler	EatWell
Dr. Kenneth Snyder	Kaleida Health
Elizabeth (Baz) Perry	FIG Lab, Division of Nutrition Sciences, Cornell University
Erin Summerlee	Rural Health Network of South Central New York
Julie Sorensen	Bassett Healthcare
Kate Miller-Corcoran	Rural Health Network of South Central New York
Maria Fisher	American Federation of State, County, and Municipal Employees
Marla Guarino	Buffalo Go Green
Michael Ball	Highmark Blue Cross Blue Shield of Western New York
Mitch Gruber	Foodlink NY
Tracy Tadaro-Ott	MVP Health

Concept Note

Food As Medicine

Starting around 2010, a movement that came to be known as Food as Medicine (FAM) began addressing food insecurity and diet-related health conditions for Americans nationwide by connecting patients to healthy food and nutritional supports by way of a referral or “prescription” from a healthcare provider. A number of studies and reports by trusted names in research, policy and philanthropy, as well as the identification of Food as Medicine as a key strategy in the 2022 White House conference on Health and Hunger point to a widespread momentum and belief in exploring and scaling these established models. The field is backed by multiple randomized clinical trials, many of which prove direct improvements on health outcomes, as well as cost savings and cost-efficiencies.

The Opportunity

To our knowledge, the programming to-date, as well as the research and literature covering it, has almost exclusively addressed Medicaid, Medicare and/or SNAP-eligible populations, and the research metrics around the economics of the interventions have been defined through a public health lens.

While these are critical demographics to support with FAM interventions, diet-related health conditions and associated healthcare costs reach a much broader population. With the nation at large seeing unprecedented levels of diabetes, cardiovascular disease and food insecurity even amongst households not reliant on Medicaid, Medicare and SNAP, and direct healthcare costs associated with diet-related health conditions estimated at \$650 billion/year⁸, there is an opportunity for private insurers to address critical and widespread health conditions while also improving their bottom line.

The Approach: Define a pilot and associated randomized controlled trial research study to make a business case for private health insurers to cover Food as Medicine programming (FAM), specifically a Produce Prescription (PRx) program model.⁹

Unique from every completed FAM pilot and study on our radar, this pilot will leverage the Produce Prescription model for *employed and privately insured individuals and metrics for analysis will be defined by that which is important for private insurer decision-making*. **The resulting study will reveal the first FAM business case for a private insurer, and the associated health outcomes for a privately insured, broader, not-yet-studied population.**

Proposed Pilot and Study Design

All details open to modification. To be refined and finalized with pilot partners.

Randomized, controlled trial of a 12-month PRx program.

<p>INTERVENTION</p>	<p>Healthy Food Access Year-long pick-ups, vouchers for or delivery of healthy foods for participants¹⁰</p> <ul style="list-style-type: none"> • Group A: <ul style="list-style-type: none"> – Months 1-6: \$80/month of PRx value for single participant, \$40/month for each additional covered family member over age 3, up to \$240/month per family; – Months 7-12: \$50/month of PRx value for single participant, \$20/month for each additional covered family member over age 3, up to \$130/month per family • Group B: <ul style="list-style-type: none"> – Months 1-12: \$50/month of PRx value for single participant, additional \$20/month for each additional covered family member over age 3, up to \$130/month per family • Group C: <ul style="list-style-type: none"> – No PRx <p>Nutrition Education and Support Examples: recipes, cooking classes, instructional videos, access to dietitian</p>
<p>PARTICIPANTS</p>	<p>Eligibility</p> <ul style="list-style-type: none"> • Member of participating health plan • Positive for food insecurity; and/or • Has uncontrolled diabetes (A1c>7.5) <p>Cohort</p> <ul style="list-style-type: none"> • 450 program participants (150/Group)
<p>PARTNERS</p>	<ul style="list-style-type: none"> • Employer - Medium-size NW NYS employer with stable lower-income employee population¹¹ • Health Insurance System Serving Population - health insurance partner • Food Redemption/Delivery partner - TBD through RFP • Technology/Data Management - TBD through RFP if needed • Evaluation Partner - TBD after project feasibility is secured • Project Management/Business Modeling - DAISA
<p>TIMEFRAME</p>	<p>3 years of programming & evaluation¹²</p> <ul style="list-style-type: none"> • 9 months initial set-up and patient recruitment • 12 months of intervention • 3 months for follow up data collection (surveys, interviews) • 6 months for final analysis • 6 months reporting (writing publication/reports)
<p>BUDGET AND FUNDING NEED</p>	<p>Approximately \$2MM (assuming a 33.3% food & intervention costs, 33.3% evaluation, 33.3% management/admin costs)</p> <p>Pilot funding anticipated from Mother Cabrini Health Foundation with expected co-investment from healthcare partner</p>

Expected Outcomes

It was estimated that U.S. adults who identify as food insecure have an annual total cost of care (see Metric 1a below) that is \$1,800 more than those who are food secure.¹³ While this potential saving alone is significant, reducing the total cost of care by implementing a Produce Prescription program is just one of many key metrics to understanding overall cost savings and outcomes, pointing to even greater outcomes when considering the full set of metrics.

Early learnings are anticipated within the first 18 months of the start of the project (including project development) and final analysis of health outcomes and business case are anticipated by 36 months. For analysis, we expect to blend the use of field standards (Metric Categories 1 and 2 below), significant metrics identified in conversations with program implementers (Metric Category 3), and metrics to be defined with the private insurer, grounded in their internal knowledge of the decision-making drivers within the company (Metrics Category 4). As with the pilot and study design, all metrics are open to modification and to be finalized with partners.

KEY METRICS

1. Total cost of care¹⁴
 - a. Reduced costly healthcare utilization (ex: lower A1c levels, chronic disease-related emergency department visits, home care, prescriptions)
 - b. Increased participant engagement in positive prevention and primary care (ex: adherence to well visits)
2. Reduced productivity loss as measured by sick days due to diet-related health conditions
3. Increase in participant/employer satisfaction, according to the health insurance model:
 - a. Standard Private Insurance:
 - i. Increased satisfaction of the healthcare plan to *current members*, ultimately increasing retention of members
 - ii. Increased attractiveness of the healthcare plan to *potential members*, ultimately increasing acquisition of members
 - b. Self Insurance with Private Insurance Administrator:
 - i. Increased satisfaction of the healthcare plan to *current employees*, ultimately increasing retention of employees
 - ii. Increased attractiveness of the healthcare plan to *potential employees*, ultimately increasing acquisition of employees
4. Additional metrics determined by or in collaboration with health insurer, and/or health insurance advisory board for a self-insured pilot

Financial Impact Model

Financial-Impact Model (current Google Spreadsheet / Excel version file)

[view resource](#)



Literature Review and Analysis

Food Insecurity and its Association with Health Care Expenditures

Food security, which is defined as “at all times, [having] physical, social, and economic access to sufficient, safe, and nutritious food that meets food preferences and dietary needs for an active and healthy life, is a critical social determinant of health. A substantial body of research has demonstrated that food insecurity negatively affects physical and mental health and well-being, with food insecure individuals more likely to develop diet-related chronic health conditions (e.g., obesity, diabetes), have depression or anxiety, and have higher health care utilization and expenditures.

Over the past decade, several studies have specifically assessed the health care costs associated with food insecurity, as there is growing interest in payer- and health system-based interventions to address individuals’ social needs, including food insecurity. While the evidence is somewhat mixed, there is substantial evidence that food insecurity is associated with higher health care utilization and higher health care expenditures, both at an individual and family level. Several studies have examined cost specifically:

- A 2018 study that used nationwide food security data from 2011 and medical expenditure (MEPS) data from 2012-2013 from ~17,000 adults found that food insecure adults had total annual health care expenditures that were **\$1,863** higher per person per year than food secure adults.¹⁵
- A 2019 study that used nationwide, county-specific medical expenditure (MEPS) and food security data from 2013 from ~10,000 adults and ~3900 children estimated that food insecure adults had annual health care expenditures that were approximately **\$1,834** higher than food secure adults, with wide variation based on geography.¹⁶
 - There was no significant difference in health care expenditures between food insecure and food secure children.
- A 2020 study that used 2016 MEPS and food security data from ~13,500 adults nationwide found that individuals with marginal, low, or very low food security had a higher likelihood of any health care expenditure, and households with very low food security were more likely to have any health care expenditure and had total health care expenditures that were **25% higher** than households with food security. **However, when controlling for chronic disease status (e.g., diabetes, hypertension), “the significant differences in total health care spending across the food security groups largely disappear.”**¹⁷

“Our results differ in a number of meaningful ways from two recent studies. Berkowitz et al found a significant link between food security and health care expenditures for diabetes, hypertensive, and heart disease patients.² Our results are directionally similar, but nonsignificant, particularly for conditional expenditures. When we replicate the methodology of Berkowitz et al² with our data, the main results are largely unchanged, suggesting variability in controls or variable definitions is not driving the differences that we find. The second study, also by Berkowitz et al,¹ found that food insecurity was associated with more ED visits and hospitalizations. In our analysis, we find that only the ED

relationship—and to a lesser extent the pharmaceutical relationship—persists. The timeframe for each study might be a potential explanation for the differences. The Berkowitz et al studies assemble household food security measures from 2011 and health care expenditure data from 2012 and 2013. If the impacts of food insecurity on household spending compound over time, increased health care expenditures may emerge in the long-term even though they are not observed in the short-term. This could shed light on why their studies detect significant differences in inpatient spending while ours does not. In addition, Berkowitz and colleagues use a dichotomous definition of food security (secure versus insecure) that differs from our nuanced categorical approach.”



- A 2023 study that assessed family food security in 2016 and healthcare expenditures in 2017 (based on 2016 and 2017 MEPS data) from ~15,000 people comprising ~6,600 families found that food insecure families had health care expenditures that were 20% higher than those of food secure families, an annual **difference of \$2,456**.¹⁸
 - Notably, “food insecurity was not associated with greater subsequent out-of-pocket expenditures but was associated with greater subsequent expenditures across all other types of health care spending (inpatient, emergency department, outpatient, and prescription drugs).”
 - Prescription drug costs were the single greatest expenditure (+\$500), followed by inpatient costs (+\$281)
 - Health care costs were higher among food insecure families regardless of the type of health care coverage they had, varying from +\$1,855 with public insurance, +\$2,017 with private insurance, and +\$3531 with different types of coverage. It is important to note that **the differences between these groups, while large, were not statistically significant.**
 - As with prior studies, there was no significant association between food insecurity and child health care expenditures but ~\$1,300 greater expenditures for individual food insecure adults.
 - Of note, families who were food insecure both years had higher total expenditures in the second year than families who were food secure both years (+\$1,849). Families who were food insecure the first year and food secure the second year also had higher healthcare expenditures in the second year (+\$1,375). There was no significant difference in healthcare expenditures between families who became food insecure as compared to families who were food secure in both years. **These findings suggest that the health impacts of food insecurity persist and affect healthcare expenditures in future years.**
 - The findings of this study “suggest that in families with mixed coverage, positive impacts of food insecurity interventions on health care use may accrue to family members other than the targeted beneficiaries and those who have different insurance, benefiting the entire family but potentially discouraging investments on the part of any one payer.”
 - “For families covered by the same carrier, initiatives at the insurer level could increase every member’s access to food, improve the health of children and adults, and reduce family healthcare expenditures in a way that unlocks both financial and health benefits.”
 - “However, we found 1 in 5 families had more than one insurance plan. Observing the full financial benefit of food insecurity interventions may be more challenging for families with mixed coverage, potentially creating

conditions which discourage investment. The number of low and middle-income parents/guardians who enroll their children on Medicaid or CHIP, rather than their employer-sponsored health insurance, is increasing due to the rising out-of-pocket expenses of private insurance, and these families are often at high risk of having unmet social needs.”

- “This complexity of households with mixed insurance coverage means that a single carrier financing an intervention may not see the full benefits of that intervention reflected in the improved health or reduced healthcare costs of the targeted family members. Such a situation could be understood as an externality in the sense that there are third party benefits (that is, benefits to parties other than the insurer and its members) that may result from a food insecurity intervention. Economic theory would suggest that such externalities could lead to less investment in initiatives than might be socially desirable. One way to address such externalities would be public subsidies for food insecurity interventions undertaken by insurers or utilizing social impact bonds. Alternatively, addressing food insecurity at the public health or social policy level, where stakeholders have responsibility for the entire population may be needed.”

It is important to note that MEPS includes both individual and payer costs; “expenditures in MEPS are comprised of direct payments for care provided during the year, including out-of-pocket payments and payments by private insurance, Medicaid, Medicare, and other sources.”¹⁹ **As such, the difference in medical expenditures incurred by food insecure individuals and families cannot be assigned only to a payer, as there are individual copay and deductible costs included in this measure.**

Additionally, while some studies show that food insecurity is associated with higher health care costs, **causality cannot be assigned to this relationship.** Individuals with food insecurity are more likely to have low income, have Medicaid insurance, and have one or more chronic conditions, and less likely to be employed, as was the case in the [2020 study](#) cited above.

Impact of Produce Prescription Programs on Diabetes

Produce prescription programs, in which individuals or households receive fresh fruits and vegetables on a regular basis for a set period of time, have shown promise for improving clinical outcomes among adults with diet-related chronic diseases, and specifically diabetes. However, many studies undertaken to date have not been rigorous in their design (e.g., no control group with pre-post design, small sample sizes), so the findings cannot be generalized. [A 2021 systematic review and meta-analysis](#) of 13 F&VRx programs (9 of which did not have a control group) found a 22% increase in F&V consumption (based on 5 studies comprised of ~1000 adults) and a 0.8% decrease in A1c.²⁰ However, the authors note that “These findings should be interpreted with caution in light of considerable heterogeneity, *methodological limitations of the included studies, and moderate to very low certainty of evidence.*”

Several recent studies have utilized more rigorous methods in order to better understand the impact of FVRx on A1c. In particular:

- A [2023 report](#) on a randomized, controlled trial of a six-month, weekly F&V delivery program among 450 adults with uncontrolled diabetes and receiving Medicaid benefits found that patients who received F&V (n=300) had a “significant improvement in blood sugar levels, with an overall average HbA1C reduction of 0.32 points, in comparison to participants in the control group” (n=150).²¹



- The reduction in A1c was greater while patients were actively receiving F&V deliveries and smaller when the intervention ended.
- Patients who received F&V had a large improvement in both food and nutrition security: “the odds of being food secure increased by about 230% and the odds of being nutrition secure increased by 370% for patients in the intervention group as compared to the control group.”
- Food insecurity was high among this cohort, with nearly 60% of participants food insecure at baseline. Additionally, average baseline A1c was 9.4% and average baseline BMI was 34; a BMI of 30 or higher is classified as obesity.
- *Full results of this study have not yet been published.*
- In a [2023 study](#) that used a randomized, wait-list controlled design to test the impact of an intensive produce prescription program (1 year of weekly groceries for 10 meals for the entire household, health coaching, medical evaluations, and diabetes education) among 350 adults with diabetes and food insecurity, there was **no significant difference in A1c** reduction between the intervention and control groups.²²
- This study used a wait-list control design, meaning that participants in the control group were aware that they would be offered the intervention after 6 months, and they were provided emergency food resources in the interim. This design may have led to improvements in food security and diet during the control group period, which may have contributed to the null result.

Finally, a [2023 modeling study](#) that incorporated data from a nationally representative sample of adults with diabetes and food insecurity and modeled the impact of a FVRx (based on 20 prior studies, only 3 of which were RCTs*) estimated that, over 25 years, providing F&VRx to 6.5 million adults with both diabetes and food insecurity would avert save \$39.6 B in health care costs** and \$4.8 B in lost productivity costs but would cost \$44.3 billion to implement, a total difference of \$100 M over 25 years (\$4 M/year); this would come at a cost of \$18,100/QALY, far lower than the \$50K/QALY threshold.

- However, over 5 years, the intervention would cost \$13.5 B and save \$11.6 B in health care costs and \$0.53 B in lost productivity costs, at a cost of \$92,700/QALY, higher than the commonly-accepted threshold of \$50K/QALY.
- *The pooled A1c reduction from these studies was 0.63%
- **Health care costs were based on MEPS and were the average total costs for office-based visits, hospital outpatient visits, emergency room visits, inpatient hospital stays, prescription drugs, dental visits, and home care; out-of-pocket expenses were not included.

Taken together, these studies suggest that F&VRx may be effective for improving A1c and reducing health care costs, but the changes are minimal.

Additional resources

- [Medical Expenditure Panel Survey](#)
- [Tufts Food is Medicine Institute: The True Cost of Food: Food is Medicine Case Study](#)
- [Feeding America: The Healthcare Costs of Food Insecurity](#) (draws largely on both studies cited above by Berkowitz et al)
- [MIT news release](#) on Doyle et al in JAMA IM
- [News release](#) on Palakshappa et al in Health Affairs

- ¹ Deuman KA, Callahan EA, Wang L, Mozaffarian D. *True Cost of Food: Food is Medicine Case Study*. Food is Medicine Institute, Friedman School, Tufts University; Boston, MA; 2023. Available at: [TuftsFoodisMedicine.org](https://tuftsfoodismedicine.org)
- ² DAISA partners with social enterprises, nonprofits, community leaders, policymakers, and mission-aligned investors with the mission to support the realization of equitable food systems and vibrant communities. In 2021, DAISA, in collaboration with Wholesome Wave, published the *Produce Prescriptions: Field Scan Research Report*, highlighting 100 Food as Medicine initiatives pioneered from 2010-2020. Since then, DAISA has been exposed to over 250 Produce Prescription Technical Assistance engagements, interviews, field visits, community practice engagements, and case studies.
- ³ See Appendix B for the full Concept Note description.
- ⁴ Logistics and contents of food distribution and the final intervention package will be finalized with the partner organizations, considering equitable aspects for the implementation of the program.
- ⁵ A full financial model is available in Appendix C
- ⁶ Palakshappa D, Garg A, Peltz A, Wong CA, Cholera R, Berkowitz SA. Food Insecurity Was Associated With Greater Family Health Care Expenditures In The US, 2016-17. *Health Aff (Millwood)*. 2023 Jan;42(1):44-52. doi: 10.1377/hlthaff.2022.00414.
- ⁷ Assuming Years counting of the financial model; for instance, Year 1 of the intervention may be considered the planning phase
- ⁸ Deuman KA, Callahan EA, Wang L, Mozaffarian D. *True Cost of Food: Food is Medicine Case Study*. Food is Medicine Institute, Friedman School, Tufts University; Boston, MA; 2023. Available at: [TuftsFoodisMedicine.org](https://tuftsfoodismedicine.org)
- ⁹ PRx model defined as provision of healthy foods, primarily fruits and vegetables, to plan members paid for either in part or full by health insurance plan.
- ¹⁰ Recommended dollar values to be updated by results of rigorous PRx research to be released in Q4 2023 and pricing of offerings from local healthy food provision partners. To be finalized with health insurance partners.
- ¹¹ Employer not needed if health insurer chooses to offer pilot across employer policies
- ¹² Seeking to start Summer 2024
- ¹³ Berkowitz SA, Basu S, Gundersen C, Seligman HK. State-level and county-level estimates of health care costs associated with food insecurity. *Prev Chronic Dis*. 2019;16:E90. doi:10.5888/pcd16.180549
- ¹⁴ Data gathered may include standard metrics used for ICER and QALY calculations and/or other cost of care metrics defined by health insurance partner.
- ¹⁵ Berkowitz SA, Basu S, Meigs JB, Seligman HK. Food Insecurity and Health Care Expenditures in the United States, 2011-2013. *Health Serv Res*. 2018 Jun;53(3):1600-1620. doi: 10.1111/1475-6773.12730.
- ¹⁶ Berkowitz SA, Basu S, Gundersen C, Seligman HK. State-Level and County-Level Estimates of Health Care Costs Associated with Food Insecurity. *Prev Chronic Dis* 2019;16:180549. DOI: <http://dx.doi.org/10.5888/pcd16.180549>.
- ¹⁷ Dean EB, French MT, Mortensen K. Food insecurity, health care utilization, and health care expenditures. *Health Serv Res*. 2020 Oct;55 Suppl 2(Suppl 2):883-893. doi: 10.1111/1475-6773.13283.
- ¹⁸ Palakshappa D, Garg A, Peltz A, Wong CA, Cholera R, Berkowitz SA. Food Insecurity Was Associated With Greater Family Health Care Expenditures In The US, 2016-17. *Health Aff (Millwood)*. 2023 Jan;42(1):44-52. doi: 10.1377/hlthaff.2022.00414.
- ¹⁹ Medical Expenditure Panel Survey. Agency for Healthcare Research and Quality. Updated January 27, 2023. Available at https://meps.ahrq.gov/mepsweb/data_stats/MEPS_topics.jsp?topicid=5Z-1.
- ²⁰ Bhat S, Coyle DH, Trieu K, Neal B, Mozaffarian D, Marklund M, Wu JHY. Healthy Food Prescription Programs and their Impact on Dietary Behavior and Cardiometabolic Risk Factors: A Systematic Review and Meta-Analysis. *Adv Nutr*. 2021 Oct 1;12(5):1944-1956. doi: 10.1093/advances/nmab039.
- ²¹ Free Weekly Produce Delivery Improved Blood Sugar, Food Security in Low-Income Adults. American Heart Association News Release. November 6, 2023. Available at <https://newsroom.heart.org/news/free-weekly-produce-delivery-improved-blood-sugar-food-security-in-low-income-adults>.
- ²² Doyle J, Alsan M, Skelley N, Lu Y, Cawley J. Effect of an Intensive Food-as-Medicine Program on Health and Health Care Use: A Randomized Clinical Trial. *JAMA Intern Med*. 2024 Feb 1;184(2):154-163. doi: 10.1001/jamainternmed.2023.6670.