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Food is Medicine:

The Effectiveness of Delaware's Feeding Families Program in Managing Chronic Conditions

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Abstract

Background. The "Food is Medicine" (FIM) model bridges healthcare and food access to mitigate chronic health conditions and address social determinants of health. **Objectives**. This study assesses the impact of the Feeding Families (FF) program, a FIM initiative by Westside Family Healthcare in Delaware, which was conducted between February 2023 and February 2024 and designed to support individuals with diabetes, hypertension, and obesity. **Methods**. We employed a quasi-experimental design to evaluate the implementation and effectiveness of the program over 12 months. The FF program provided participants with nutrient-dense food, bi-weekly nutrition counseling, and behavioral support. Data on body mass index (BMI), glycated hemoglobin (A1C), and fruit and vegetable intake were collected from 43 participants at baseline, midpoint, and endpoint. Participant knowledge, dietary behaviors and food insecurity, changes in goal setting, consumption of sodium, sugar, and fats were also assessed. **Results**. Participants demonstrated significant reductions in BMI and improved dietary behaviors, including decreased consumption of sodium, sugar, and fats. While changes in A1C levels were not statistically significant, the overall trend indicated improvement. The program also led to modest enhancements in food security. **Conclusion**. The Feeding Families program contributes to improving health outcomes among populations with chronic diseases, particularly in reducing BMI and promoting healthier dietary behaviors around sodium, sugar, and fat consumption. **Policy Implications**. The Feeding Families program demonstrates the potential of integrating tailored nutrition, behavioral support, and healthcare services to manage chronic conditions through 'Food Is Medicine' best practices, and its impact on BMI, salt, sugar and fat reduction among other benefits. Delaware should prioritize FIM, including establishing Medicaid waivers for funding.

Introduction

Over the last decade, the concept of Food is Medicine (FIM) has gained significant recognition among health practitioners and researchers as a promising approach to addressing both the nutritional needs of patients with chronic diseases and the broader social determinants of health. FIM programs encompass a range of interventions aimed at improving nutrition and health outcomes through targeted food-related strategies in partnership with healthcare and a food provider, to provide dietary counseling, education, resources, and food in the form of fresh or staple groceries, medically tailored meals (MTM), food vouchers, coupons and/or produce

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prescriptions as well as other strategies intended to promote nutrition security on a broader scale for patients.[1] The link between nutrition and health outcomes is well-established, with multiple studies showing that diets rich in fruits, vegetables, whole grains, lean proteins, and healthy fats are linked to lower risks of chronic diseases,[2] while diets high in processed foods, sugars, and unhealthy fats, and lacking essential nutrients, contribute to the onset and progression of these diseases.[2–4] Recently, The American Heart Association's First National Summit on Food is Medicine emphasized the potential for FIM interventions and the need to better understand impacts on health outcomes and health costs.[5]

In Delaware, like many states in the US, reducing the burden of diseases and preventable health care costs is especially critical. A 2024 report released by the Delaware Division of Public Health (DPH) reported that 61% of deaths in Delaware in 2020 were due to chronic diseases.[6] In the same year, Delaware ranked fifth among all U.S. states in per capita health care spending (an average of $12, 899 per Delawarean per year).[7] Heart disease accounts for 19% of deaths in Delaware, with age-adjusted mortality rates showing a decline. Mortality rates were 158.8 per 100,000 residents in 2016-2020, a decrease from previous years. The prevalence of heart disease has remained stable, with 4.5% of adults reporting coronary heart disease or angina as of 2022. Approximately 95,100 adults in Delaware, or 11.6% of the adult population, have been diagnosed with diabetes. Every year, an estimated 4,800 adults in Delaware are diagnosed with diabetes, with prediabetes and diabetes costing the state $1.1 billion each year.[8] Approximately 311,300 adults in Delaware, or 37.9% of the adult population, have obesity. According to the Center for Disease Control, chronic diseases were responsible for an estimated $4.1 trillion in healthcare costs and lost productivity in 2020.[9,10] Emerging evidence indicates that Food Is Medicine programs reduce healthcare costs and improve quality of life, especially for medically vulnerable populations. For example, a 2023 study found that medically tailored meals for chronically ill patients resulted in approximately 16% lower healthcare costs compared to matched controls, with significant reductions in hospital admissions (49%) and nursing home admissions (72%).[11] Research on produce prescription programs has also demonstrated a return on investment of about $1.002 for every dollar spent, with an average per-person healthcare cost reduction of $609 annually among participants with type 2 diabetes.[12]

Given the promise of the FIM model and the need in Delaware, the current study examines the Feeding Families (FF) program, by Westside Family Healthcare (WFH) in Delaware, which directly aligns with the core principles of FIM research and is a comprehensive FIM intervention for individuals at risk of living with conditions such as diabetes, hypertension, and obesity. The study seeks to address a critical gap in the literature by examining the effectiveness of a comprehensive, community-based FIM intervention delivered in a Federally Qualified Health Center (FQHC) in Delaware.

Feeding Families FIM Program: The Feeding Families program offers tailored nutrition, behavioral support, access to nutrient-dense foods, and integration with healthcare systems in alignment with FIM best practices.[5] The program is administered over 12 months by Westside Family Healthcare (WFH), a community-focused, non-partisan Federally Qualified Health Center located in Wilmington, DE. The program provides participants with chronic conditions, such as diabetes, hypertension, and obesity, with weekly home deliveries of nutrient-dense foods from Hungry Harvest, a local farm-to-door-step produce delivery service, supplemented with whole grains and lean proteins enough for the entire family. In addition, bi-weekly nutrition counseling and support from Community Health Workers, 3-4 incentives to meet health goals

and support healthy lifestyles, such as small cooking appliances (such as blenders and scales) are provided as part of the program. The nutrition counseling and support from healthcare workers offers education on chronic disease management and sustainable behavior change.[12]

Methods

This study used a quasi-experimental, evaluation design with baseline, mid-point (6 months), and post-intervention assessments (12 months), to evaluate the impacts of the Feeding Families program which ran from February 2023 to March 2024. Recruitment was conducted over a two-month period in 2022 using multiple methods, including phone calls, flyers, and physician referrals from WFH clinics. The participant inclusion criteria for the "Feeding Families" program required participants to be adult patients (18 years or older) at Wilmington Family Health (WFH) residing in New Castle County, Delaware, to ensure accessibility within the program's delivery area. Eligible participants needed to have at least one of the following chronic health conditions: uncontrolled diabetes (with a hemoglobin A1C level above 8), hypertension, or obesity. Participants were expected to engage in regular bi-weekly check-ins with community health workers, attend monthly counseling sessions with registered dietitians, and complete surveys at baseline, midpoint, and endpoint. Programming began in February 2023, with baseline data collected from February to June 2023, midpoint data from September to December 2023, and endpoint data from February to March 2024. Each participant was assigned a unique identification number to facilitate data tracking, with personally identifiable information accessible only to approved WFH staff.

Data collection tools for this study included: a survey of Participant Knowledge, Dietary Behaviors, and Food Security, Fruit and Vegetable Screener, and Ambulatory Medical Records (AMRs), as described below. All program materials and surveys were made available to participants in both English and Spanish to increase accessibility. Protocols were reviewed and approved by the Institutional Review Board (IRB) of the University of Delaware prior to study implementation.

1. *Ambulatory Medical Records (AMRs):* The clinical data, including A1C, height, and weight (which were used to calculate BMI), were collected as part of the research study according to the study protocol at the specified time intervals and recorded in the AMR. This approach ensured that both the clinical and research teams could utilize the data effectively throughout the study period. WFH accessed these records and shared de-identified data with UD-CRESP for analysis.
2. *Fruit and Vegetable Screener:* The National Cancer Institute’s Fruit and Vegetable Screener (part of the Eating at America's Table Study Quick Food Scan) is a self-administered dietary assessment tool.[13] It evaluates fruit and vegetable intake based on frequency and portion sizes consumed over the past month.
3. *Participant Knowledge, Dietary Behaviors, and Food Security Survey:* This survey addressed participants’ knowledge about nutrition and their own health, dietary behaviors, food security, and commitment to health goals. Participant’s consumption of salt, sugar and fat were also tracked for possible dietary changes. WFH social services coordinators administered the survey verbally.

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Analytic Approach

Primary outcomes included body mass index (BMI), glycated hemoglobin (A1C), and daily fruit and vegetable (FV) consumption. Initially descriptive statistics, such as frequency distributions, means, and standard deviations were reviewed. We then used repeated measures regression models to examine whether there was an effect of time on the outcomes of interest. Because fewer respondents completed the endpoint survey than the baseline and midpoint surveys, we used custom hypothesis tests to examine whether there was a statistically significant difference in BMI and A1C between the baseline value and the average of the midpoint and endpoint values. To assess these changes over time, the mean difference between the three-time points was examined for the key outcome measures (daily FV consumption, BMI, and A1C) and other descriptive statistics (such as standard deviations and frequency distributions) were computed for all data to evaluate the effectiveness of the intervention on health outcomes. For the food insecurity items, a regression model that tested whether there was a difference in reported food insecurity (dichotomized) at endpoint vs. baseline was used. Respondents who selected "Don't know "or "Refuse to Answer" were excluded. Repeated-measures regression models were used to analyze the change in the mean response over time. For the BMI and A1C measures, which had more missingness in the endpoint values, we used custom hypothesis tests to test the difference between the baseline and the average of the midpoint and endpoint responses. A mixed-effects linear regression was also conducted to assess changes in the use of the items in the food box over time, controlling for random variations across participants. The model included time as a fixed effect and random intercepts and slopes for time across participants.

Participant Characteristics

A total of 57 participants were recruited, of these, 14 were either unenrolled or excluded due to reasons such as relocation, extended travel abroad, pregnancy, incorrect diagnosis, inability to meet visit requirements, participation in another study, or lack of response to contact attempts, leaving a final sample size of 43. The average age of the participants was nearly 60 years old (58.7), and most participants were over the age of 40 (Table 1). Two-thirds of the participants were women (67%) and one-third were men (33%). Approximately half of the participants were Black or African American (42%) and the other half were White (47%), with a smaller number of participants being American Indian or Alaskan Native (2%). One-third of participants were Hispanic or Latino (33%). All participants had obesity, diabetes or high blood pressure, and nearly half had two or more of these conditions.

Table 1. Participant Characteristics

	n	%
Age		
20-29	1	2.3%
30-39	0	0.0%
40-49	11	25.6%
50-59	12	27.9%
60-69	11	25.6%
70-79	4	9.3%
80-89	3	7.0%
90-99	1	2.3%

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Gender		
Women	29	67.4%
Men	14	32.6%
Race		
American Indian or Alaskan Native	1	2.3%
Black or African American	18	41.9%
White	20	46.5%
Not Reported	4	9.3%
Ethnicity		
Hispanic or Latino	14	32.6%
Not Hispanic or Latino	26	60.5%
Not reported	3	7.0%
Health Conditions of Participants		
Obesity	21	48.84%
Diabetes	24	55.81%
Hypertension	26	60.47%
Comorbidity	21	48.84%

Results

Table 2 provides outcome data on primary outcomes including body mass index (BMI), HbA1c, and Fruit and Vegetable consumption. Significant decreases in BMI *($p < .05$)* were observed for program participants between baseline and midpoint (~6 month), as well as baseline and endpoint (~1yr). We detected an effect of time for the analysis of change in BMI values, $F(2, 73) = 3.34$, $p = .0409$. On average, there was a 0.73-point decrease in BMI between the baseline and the average of the midpoint and endpoint values ($p = 0.0137$) as well as an average 0.86-point decrease between the baseline and endpoint values ($p = 0.0164$).

HbA1c changes also demonstrated a decline but did not reach statistically significant differences *($p > 0.05$),* likely due to the fact that HbA1c was only captured for the smaller sample of participants who were diabetic (n=24 at baseline). We did not detect an effect of time for the analysis of change in A1C values, $F(2, 31) = 0.13$, $p = 0.8749$.

No change in Fruit and Vegetable consumption was detected.

Table 2. Primary and Secondary Outcomes

	Baseline		Midpoint		Endpoint	
	n	Mean (std. dev)	n	Mean (std. dev)	n	Mean (std. dev)
Daily Servings FV Consumption	41	4.39 (1.84)	34	3.97 (1.41)	37	4.29 (1.69)

BMI	44	35.95 (9.87)	41	35.79 (9.67)	34	35.14 (8.3)
A1C	24	7.87 (2.15)	20	7.44 (1.53)	19	7.91 (2.23)
Participants using All Food Box Items (%)	22	45.45%	22	86.46%	22	95.45%
Behavioral Change: *Percent of Participants Self-Reporting a Reduction in Consumption of:*						
Sodium	39	58.97%	33	87.88%	34	88.24%
Sugar	40	65.00%	33	90.91%	34	91.18%
Fat	39	66.67%	33	87.88%	34	88.24%
Food Insecurity Screener:						
Percentage of participants reporting 'never true' to worrying about food running out before they got money to buy more within the past six months.	51	39%	38	47%	41	56%
Percentage of participants reporting 'never true' to the statement: 'Within the past six months, the food I bought just didn't last, and I didn't have money to get more	51	37%	38	42%	41	58%
Commitment to Health Goals:						
Percentage working towards health goal	38	90%	35	96%	20	97%
Percentage Reporting Progress Due to the Program	38	97%	35	100%	20	97%

Food Insecurity

Findings related to changes in food insecurity show a difference *($p < 0.10$)* in participants feeling that their food did not last and they lacked the money to buy more. In alignment, the same data showed that participants by the end of the intervention period were 61% less likely to report that their food did not last and that they lacked the money to purchase more. Findings related to pre and post-measures regarding participants worrying that their food would run out did not show

significant differences compared to baseline. However, participants were 57% less likely to express worry that food would run out before they could buy more at the end of the intervention period.

Use of Food Items

The percentage of participants using all food box items increased across three time points: from 45.45% at baseline, to 86.46% at the midpoint, and reached 95.45% at the endpoint (Table 2). A mixed-effects linear regression, controlling for random variations across participants (N = 19), which included time as a fixed effect and random intercepts and slopes for time across participants revealed a significant effect of time on food utilization, *b=0.25, SE = 0.06, z = 4.40, p < 0.001, 95% CI [0.138, 0.361]*. This finding indicates that the use of the items in the food box significantly increased over time between baseline and endpoint survey.

Behavioral Change: Sodium, Sugar and Fat Consumption

Participants reported having reduced their sodium consumption between baseline and midpoint (odds ratio (OR) = 5.05, $p = 0.0120$) and between the baseline and the endpoint (OR = 5.21, $p = 0.0101$). Similarly, participants reduced sugar intake between baseline and the midpoint survey (OR = 5.37, $p = 0.0175$, and between the baseline and endpoint (OR = 5.58, $p = 0.0153$). Participants also reported having reduced their fat intake between the baseline and the midpoint survey (OR = 3.63, $p = 0.0472$), but the reduction in fat intake between the baseline and the endpoint survey was not statistically significant (OR = 3.74, $p = 0.0410$). For all three analyses, we did not find evidence of statistically significant reductions in intake of sodium, sugar, or fat between the midpoint and endpoint surveys.

Behavioral Change, Knowledge and Skills to Prepare Healthy Meals

Participants were also asked if they had the knowledge and skills to prepare healthy meals for their families (Figure 1). The percentage of participants who agreed or strongly agreed increased from baseline to midpoint, and increased from baseline to endpoint. Specifically, the knowledge and skills (strongly agree) to prepare healthy meals for their family increased from 29% at baseline to 58% (agree) by the end of the program.

Figure 1. Knowledge and Skills to Prepare Healthy Meals

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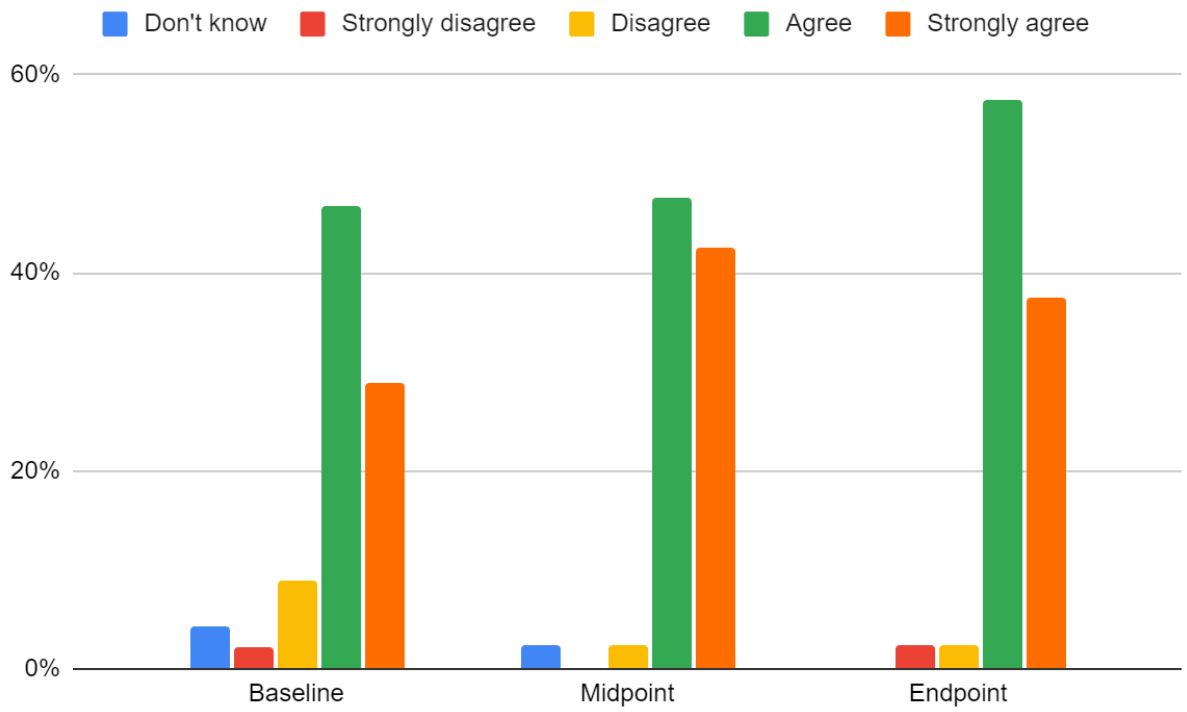

Description of Health Goals

As shown in Figure 2, participants in the program had varied goals they committed to, including diet improvement, weight management, blood pressure control, blood sugar control, and physical activity. During November and December, some goals like diet improvement and physical activity saw a decline; weight loss commitment peaked in December.

Figure 2. Description of Health Goals by Participants

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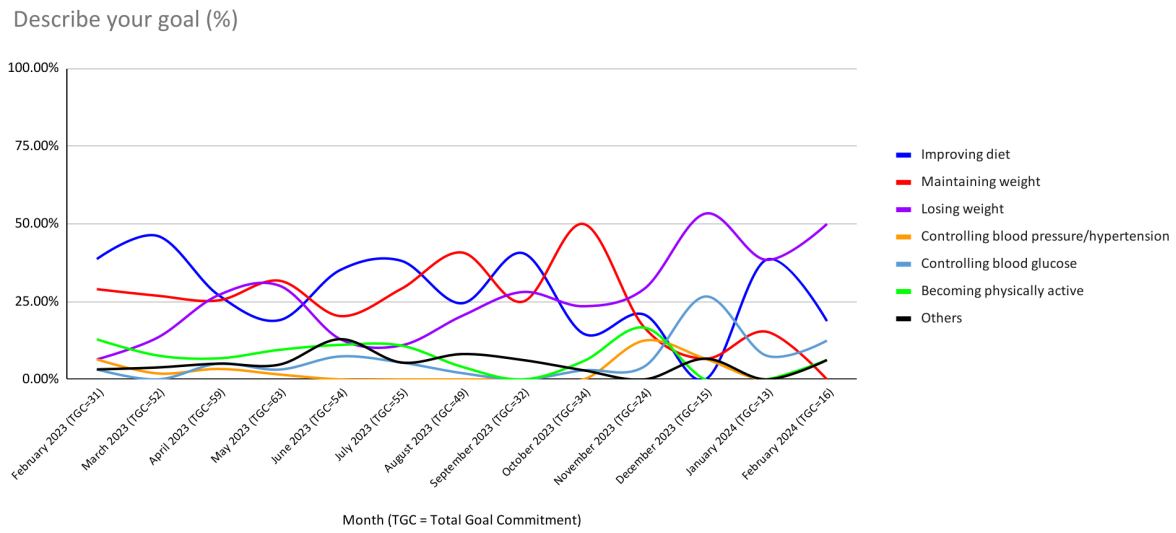

Progress Towards Health Goal

Participants demonstrated high levels of engagement with health goal setting and progress toward achieving their goals over the 12-month period. At the start of the program, 90% of participants reported having identified a health-related goal. By the midpoint, 91% reported making progress toward their goal, and 97% stated that the program helped them make progress in achieving their goals.

Discussion

FIM programs, though conceptually straightforward, are complex interventions with many stakeholders and logistical considerations. Evidence from the Feeding Families program and previous studies highlights the need for tailored, multi-faceted approaches that integrate diverse supports, including regular outreach, incentives, and carefully designed food offerings delivered directly to households. These findings align with the results of other community-based nutritional interventions, such as the DASH (Dietary Approaches to Stop Hypertension) studies, which have shown that providing dietary education alongside nutritional support can significantly influence dietary patterns.[14] However, the effectiveness of these programs relies heavily on the commitment of interdisciplinary teams who must navigate the dual demands of adhering to rigorous protocols while remaining flexible enough to foster strong, trusting relationships with participants. This balance is particularly critical when addressing the needs of medically and socio-economically complex populations, such as the cohort in this study, which was characterized by an older population (average age 59 years) and a high burden of comorbidities.

One of the primary goals of the Feeding Families Program was to reduce participants' BMI and A1C levels, which are critical indicators for managing obesity and diabetes. Of note, blood pressure was not included as a primary outcome variable given its high variability based on numerous factors beyond diet, including stress, time of day, hygiene, medication adherence, and measurement technique and because changes in blood pressure typically require longer intervention periods to demonstrate significant and sustainable improvements compared to BMI and A1C. Cholesterol was not included as it requires laboratory blood tests that are more

resource-intensive and costly compared to A1C testing and BMI measurements. Further, changes in cholesterol profiles typically take longer to manifest in response to dietary interventions than changes in A1C.

Significant decreases in BMI were observed between baseline, midpoint, and endpoint, suggesting that the program positively contributed to weight management among participants. These results indicate significant progress in reducing BMI among participants, supporting the effectiveness of FIM interventions in promoting weight loss. The observed reductions in BMI align with findings from prior studies,[15–17] which demonstrated that a structured combination of dietary modification could lead to meaningful weight loss, reduce the risk of diabetes, obesity and heart failure respectively, hence contributing to positive health outcomes. While A1C levels showed a decline among participants from baseline to midpoint, the change was not statistically significant. This may be attributed to the limited sample size of participants (n=24 at baseline), reducing the statistical power to detect meaningful differences. Future iterations of the program may benefit from a larger cohort of participants and a more time for the intervention to achieve glycemic control, as meaningful improvements in metabolic markers like A1C may require longer follow-up periods, particularly for individuals with multiple comorbidities.[18] Findings on the analysis of change in BMI and A1C are consistent with other studies e.g. Fresh Food Farmacy™ program,[19] where FIM interventions led to modest improvements in biomarkers related to chronic disease management.

Goal setting played a foundational role in the program, with nearly all participants (97%) reporting that the program helped them stay committed to their health goals. Several studies have shown that goal setting, particularly when it involves small, incremental targets, can enhance motivation and engagement in health behaviors.[20] Grounded in Self-Determination Theory,[21] the process of setting health goals fosters a sense of autonomy and competence, which may account for the high levels of participant engagement observed throughout the program. Our findings were consistent with prior studies[22–24] which showed that strong goal-setting improves obesity outcomes. Other studies showed that goal-setting increases dietary fiber, fruit, and vegetable consumption.[23,25] A study conducted by Shilts et al. reported that 80% of parents in their *Obesity Prevention Behavior Change Strategy for Low-Income Parents with Young Children* indicated that the goal-setting component was very helpful in preventing pediatric obesity and contributed to a decrease in parental BMI.[24]

Reducing sodium, sugar, and fat intake can lead to improved health outcomes, which are critical for managing conditions like hypertension, diabetes, and cardiovascular disease.[14] The FF program was effective in promoting behavioral changes in reducing sodium, sugar, and fat consumption as the proportion of participants reporting a reduction in dietary sodium increased from 58.97% at baseline to 88.24% at endpoint. Similar trends were observed for sugar and fat reduction. These improvements in dietary behaviors were largely sustained from baseline to the endpoint survey for sodium and sugar, but the reduction in fat intake was not statistically significant at the endpoint. However, the lack of significant progress between the midpoint and endpoint surveys suggests the intervention's effectiveness plateaued over time, highlighting potential challenges in maintaining long-term behavioral change, or reflecting seasonality differences in diet which were difficult to account for in our design.

Despite clear indications that the box was regularly received and the food consumed, changes in food security measures were more limited than anticipated with a significant improvement in average response to only one of the two standard food insecurity questions. Our findings

however are relatively consistent with other studies where modest changes in food insecurity are commonly observed, often because the amount of food provided through most FIM interventions is insufficient to fully address participants' needs or replace their regular food sources.[26–30] Despite positive feedback about the food box and its produce, food frequency survey data did not show a significant increase in fruit and vegetable consumption, suggesting that barriers such as food preferences and preparation skills may have influenced participants' dietary choices or that our measures are not sensitive enough for this population. Future research to understand whether this finding is an artifact of the tools available or directly tied to the need for additional cooking or preparation support is needed. Efforts to examine interest or acceptability of pre-prepared meal kits for example may help to better understand this outcome.

Study Limitations

This study has several limitations that should be considered when interpreting the results. First, the relatively small sample size (n=43) limited statistical power, particularly for subgroup analyses such as A1C levels among participants with diabetes. The quasi-experimental design without a control group makes it difficult to attribute changes solely to the intervention, as external factors may have influenced outcomes. Self-reported dietary behavior changes (sodium, sugar, and fat consumption) may be subject to social desirability bias, where participants report behaviors they believe are expected rather than actual practices. The 12-month intervention period, while substantial, may be insufficient to observe significant changes in certain clinical markers like A1C, especially among participants with multiple comorbidities. Participant attrition was notable for some measures, with fewer respondents completing the endpoint survey compared to baseline and midpoint assessments, potentially introducing selection bias if those who remained differed systematically from those who withdrew.

The study population was predominantly older adults (average age 58.7 years) with established chronic conditions, potentially limiting generalizability to younger populations or those at earlier stages of disease development. This is also a contextual consideration for findings given the potential for more comorbidities in older adults. Furthermore, the intervention was conducted in a specific geographic location (New Castle County, Delaware) with particular socioeconomic and healthcare infrastructure characteristics that may not translate to other settings. Finally, while the study assessed behavioral changes and clinical outcomes, it did not include comprehensive cost-effectiveness analyses, which would be valuable for policy decisions regarding scaling and sustaining such FIM interventions.

Public Health Implications

From a public health perspective, Food Is Medicine (FIM) interventions represent a rare example of healthcare initiatives that both improve health outcomes and generate cost savings. Recent evidence demonstrates significant healthcare cost reductions from FIM program implementation. For example, a national implementation of medically tailored meals (MTMs) could prevent 1.6 million hospitalizations annually, yielding net savings of $13.6 billion in healthcare costs. Similarly, produce prescription programs for patients with diabetes and food insecurity could prevent 292,000 cardiovascular events while being cost-effective from a societal perspective.[31]

These findings are reinforced by a recent Massachusetts Medicaid study showing nutrition support programs were associated with a 23% reduction in hospitalizations and 13% fewer emergency department visits, with particularly promising results following the COVID-19

pandemic.[32] For adults enrolled more than 90 days, healthcare costs decreased by $2,502 per person, exceeding the average program cost of $2,292 and yielding net savings of approximately $210 per person.[32]

The Feeding Families program further illustrates this potential by integrating tailored nutrition, behavioral support, and healthcare services to manage chronic conditions through FIM best practices, demonstrating measurable impacts on BMI, salt, sugar, and fat reduction. Beyond individual health improvements, the program highlights Federally Qualified Health Centers (FQHCs) as vital partners in health promotion who are uniquely positioned to implement these interventions when adequately resourced.

Next Steps

The Feeding Families program demonstrates the preliminary effectiveness of a comprehensive Food is Medicine (FIM) initiative in improving health outcomes in a FQHC setting, particularly BMI reduction and healthier dietary behaviors among participants with chronic conditions. The improvements in consumption patterns of sodium, sugar, and fat, coupled with participants' enhanced knowledge and skills in preparing healthy meals, suggest that multifaceted interventions combining food provision, nutrition education, and behavioral support can drive meaningful change in health behaviors.

Moving forward, several key next steps could enhance and expand upon this work. First, scaling the program to reach a larger population would strengthen the evidence base and allow for more robust statistical analyses, particularly for clinical outcomes such as A1C. Second, extending the intervention duration beyond 12 months may reveal more substantial improvements in clinical markers that typically require longer time frames to demonstrate significant change. Third, incorporating more frequent assessment points and mixed-methods approaches would provide deeper insights into participants' experiences, barriers, and facilitators of dietary change.

The timing for expansion is particularly opportune given Governor Myers' recent establishment of a Food is Medicine Task Force in Delaware. This policy initiative represents critical recognition of FIM as a viable strategy for addressing chronic disease management and prevention at the state level and a call for coordination and cooperation across the state to expand established efforts. The task force's work to develop sustainable funding mechanisms, examine and maximally utilize Medicaid waivers for FIM interventions, and create standardized implementation frameworks and data collection will be instrumental in scaling programs like Feeding Families across Delaware's healthcare landscape.

Conclusion

In conclusion, the Feeding Families program provides valuable evidence supporting the integration of food and nutrition interventions within healthcare settings to address chronic disease management. The program's success in improving BMI and dietary behaviors, coupled with high levels of participant engagement and goal achievement, demonstrates the potential of the FIM model. With the support of Governor Myers' Food is Medicine Task Force and a commitment to continued refinement based on the lessons learned, Delaware is well-positioned to become a leader in implementing evidence-based FIM interventions that meaningfully impact public health outcomes and reduce healthcare costs associated with chronic disease management.

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References

1. Gao, Y., Yang, A., Zurbau, A., & Gucciardi, E. (2023, March). The effect of food is medicine interventions on diabetes-related health outcomes among low-income and food-insecure individuals: A systematic review and meta-analysis. *Canadian Journal of Diabetes*, *47*(2), 143–152. https://doi.org/10.1016/j.jcjd.2022.11.001 PubMed
2. Jayedi, A., Soltani, S., Abdolshahi, A., & Shab-Bidar, S. (2020, December 14). Healthy and unhealthy dietary patterns and the risk of chronic disease: An umbrella review of meta-analyses of prospective cohort studies. *British Journal of Nutrition*, *124*(11), 1133–1144. https://doi.org/10.1017/S0007114520002330 PubMed
3. Hager, K., Du, M., Li, Z., Mozaffarian, D., Chui, K., Shi, P., . . . Zhang, F. F. (2023, September). Impact of produce prescriptions on diet, food security, and cardiometabolic health outcomes: A multisite evaluation of 9 produce prescription programs in the United States. *Cir Cardiovasc Qual Outcomes, 16*(9), e009520. https://doi.org/10.1161/CIRCOUTCOMES.122.009520 PubMed
4. Rippe, J. M., & Angelopoulos, T. J. (2016, November 4). Relationship between added sugars consumption and chronic disease risk factors: Current understanding. *Nutrients*, *8*(11), 697. https://doi.org/10.3390/nu8110697 PubMed
5. Volpp, K. G., Berkowitz, S. A., Sharma, S. V., Anderson, C. A. M., Brewer, L. C., Elkind, M. S. V., ... Zachariah, J. P. V., & the American Heart Association. (2023, October 31). Food is medicine: A presidential advisory from the American heart association. *Circulation, 148*(18), 1417–1439. https://doi.org/10.1161/CIR.0000000000001182 PubMed
6. Delaware Department of Health and Social Services. (2024). The burden of chronic disease in delaware 2024. Delaware Department of Health and Social Services. https://dhss.delaware.gov/dph/dpc/files/BurdenOfChronicDiseaseInDelaware2024Final.pdf
7. Centers for Medicare & Medicaid Services. (2020). Health Expenditures by State of Residence, 1991-2020. Office of the Actuary, National Health Statistics Group. https://www.cms.gov/data-research/statistics-trends-and-reports/national-health-expenditure-data/state-residence
8. Delaware Department of Health and Social Services. (2023). The impact of diabetes in Delaware. https://dhss.delaware.gov/dph/dpc/files/diabetesburdenreports23.pdf
9. Center for Diseases Control. (2024b, July). Fast Facts: Health and Economic Costs of Chronic Conditions. Chronic Diseases. https://www.cdc.gov/chronic-disease/data-research/facts-stats/index.html
10. Hacker, K. (2024, January 20). The burden of chronic disease. *Mayo Clinic Proceedings. Innovations, Quality & Outcomes*, *8*(1), 112–119. https://doi.org/10.1016/j.mayocpiqo.2023.08.005 PubMed
11. Berkowitz, S. A., Terranova, J., Randall, L., Cranston, K., Waters, D. B., & Hsu, J. (2019, June 1). Association between receipt of a medically tailored meal program and health care use. *JAMA Internal Medicine*, *179*(6), 786–793. https://doi.org/10.1001/jamainternmed.2019.0198 PubMed

12. Downer, S., Berkowitz, S. A., Harlan, T. S., Olstad, D. L., & Mozaffarian, D. (2020, June 29). Food is medicine: Actions to integrate food and nutrition into healthcare. *BMJ (Clinical Research Ed.)*, *369*, m2482. https://doi.org/10.1136/bmj.m2482 PubMed

13. National Cancer Institute. (2000). Eating at America's table study: quick food scan. National Cancer Institute. https://epi.grants.cancer.gov/diet/screeners/fruitveg/instrument.html

14. Appel, L. J., Moore, T. J., Obarzanek, E., Vollmer, W. M., Svetkey, L. P., Sacks, F. M., ... Karanja, N., & the DASH Collaborative Research Group. (1997, April 17). A clinical trial of the effects of dietary patterns on blood pressure. *The New England Journal of Medicine, 336*(16), 1117–1124. https://doi.org/10.1056/NEJM199704173361601 PubMed

15. El Hajj, E. C., El Hajj, M. C., Sykes, B., Lamicq, M., Zile, M. R., Malcolm, R., . . . Litwin, S. E. (2021, November 2). Pragmatic weight management program for patients with obesity and heart failure with preserved ejection fraction. *Journal of the American Heart Association*, *10*(21), e022930. https://doi.org/10.1161/JAHA.121.022930 PubMed

16. Greco, M., Chiefari, E., Montalcini, T., Accattato, F., Costanzo, F. S., Pujia, A., . . . Gulletta, E. (2014). Early effects of a hypocaloric, Mediterranean diet on laboratory parameters in obese individuals. *Mediators of Inflammation*, *2014*(1), 750860. https://doi.org/10.1155/2014/750860 PubMed

17. Vitale, M., Masulli, M., Calabrese, I., Rivellese, A. A., Bonora, E., Signorini, S., ... Vaccaro, O., & the TOSCA.IT Study Group. (2018, August 10). Impact of a Mediterranean dietary pattern and its components on cardiovascular risk factors, glucose control, and body weight in people with type 2 diabetes: A real-life study. *Nutrients, 10*(8), 1067. https://doi.org/10.3390/nu10081067 PubMed

18. Gaede, P., Lund-Andersen, H., Parving, H.-H., & Pedersen, O. (2008, February 7). Effect of a multifactorial intervention on mortality in type 2 diabetes. *The New England Journal of Medicine*, *358*(6), 580–591. https://doi.org/10.1056/NEJMoa0706245 PubMed

19. Biber, D. D. (2023, April). A pilot evaluation of the Food as Medicine program for patients with type 2 diabetes. *Evaluation and Program Planning*, *97*, 102234. https://doi.org/10.1016/j.evalprogplan.2023.102234 PubMed

20. Locke, E. A., & Latham, G. P. (2002, September). Building a practically useful theory of goal setting and task motivation. A 35-year odyssey. *The American Psychologist*, *57*(9), 705–717. https://doi.org/10.1037/0003-066X.57.9.705 PubMed

21. Ryan, R. M., & Deci, E. L. (2000, January). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *The American Psychologist*, *55*(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68 PubMed

22. Nyer, P. U., & Dellande, S. (2010). Public commitment as a motivator for weight loss. *Psychology and Marketing*, *27*(1), 1–12. https://doi.org/10.1002/mar.20316

23. Schnoll, R., & Zimmerman, B. J. (2001, September). Self-regulation training enhances dietary self-efficacy and dietary fiber consumption. *Journal of the American Dietetic Association*, *101*(9), 1006–1011. https://doi.org/10.1016/S0002-8223(01)00249-8 PubMed

24. Shilts, M. K., Sitnic, S. L., Ontai, L., & Townsend, M. S. (2018). Guided goal setting: A feasible obesity prevention behavior change strategy for low-income parents with young

children. *Journal of Human Sciences and Extension*, *6*(3), 11. https://doi.org/10.54718/SKQL2392

25. Lutz, S. F., Ammerman, A. S., Atwood, J. R., Campbell, M. K., DeVellis, R. F., & Rosamond, W. D. (1999, June). Innovative newsletter interventions improve fruit and vegetable consumption in healthy adults. *Journal of the American Dietetic Association*, *99*(6), 705–709. https://doi.org/10.1016/S0002-8223(99)00169-8 PubMed
26. Aiyer, J. N., Raber, M., Bello, R. S., Brewster, A., Caballero, E., Chennisi, C., . . . Sharma, S. V. (2019, October 1). A pilot food prescription program promotes produce intake and decreases food insecurity. *Translational Behavioral Medicine*, *9*(5), 922–930. https://doi.org/10.1093/tbm/ibz112 PubMed
27. Berkowitz, S. A., Terranova, J., Randall, L., Cranston, K., Waters, D. B., & Hsu, J. (2019, June 1). Association between receipt of a medically tailored meal program and health care use. *JAMA Internal Medicine*, *179*(6), 786–793. https://doi.org/10.1001/jamainternmed.2019.0198 PubMed
28. Cheyne, K., Smith, M., Felter, E. M., Orozco, M., Steiner, E. A., Park, Y., & Gary-Webb, T. L. (2020, January 9). Food bank–based diabetes prevention intervention to address food security, dietary intake, and physical activity in a food-insecure cohort at high risk for diabetes. *Preventing Chronic Disease*, *17*, 190210. https://doi.org/10.5888/pcd17.190210 PubMed
29. Palar, K., Napoles, T., Hufstedler, L. L., Seligman, H., Hecht, F. M., Madsen, K., . . . Weiser, S. D. (2017, February). Comprehensive and medically appropriate food support is associated with improved HIV and diabetes health. *Journal of Urban Health*, *94*(1), 87–99. https://doi.org/10.1007/s11524-016-0129-7 PubMed
30. Rosas, L. G., Chen, S., Xiao, L., Baiocchi, M., Chen, W., Emmert-Aronson, B. O., . . . Tester, J. (2024). Abstract 21: Examining the impact of food as medicine on heart health. *Circulation*, *149*(Suppl_1), A21–A21. https://doi.org/10.1161/circ.149.suppl_1.21
31. TuftsNow. (2023, September 26). Report Shows Food is Medicine Interventions Would Save Lives and Billions of Dollars | Tufts Now. https://now.tufts.edu/2023/09/26/report-shows-food-medicine-interventions-would-save-lives-and-billions-dollars
32. Hager, K., Sabatino, M., Williams, J., Ash, A. S., Halasa-Rappel, Y., Flahive, J. M., . . . Alcusky, M. J. (2025, April). Medicaid nutrition supports associated with reductions in hospitalizations and ED visits in Massachusetts, 2020–23: Article examines a nutrition support program's impact on hospitalizations and ED visits in Massachusetts. *Health Affairs*, *44*(4), 413–421. https://doi.org/10.1377/hlthaff.2024.01409 PubMed