Prescribing Food as Medicine among Individuals Experiencing Diabetes and Food Insecurity in the United States

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Sector(s): Health

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Location: Pennsylvania, United States of America

Sample: 500 individuals

Outcome of interest: Non-communicable diseases

Intervention type: Health care delivery

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Diabetes is one of the most prevalent diseases in the United States and is closely linked to food insecurity. Researchers evaluated the impact of an intensive food-as-medicine program that provides fresh food and diabetes education on health and health care utilization for individuals experiencing both diabetes and food insecurity. Researchers found that the program had high levels of engagement. Patients in both the program and the comparison group saw improvements in health outcomes over time, but there were no significant differences between groups.

Policy issue

Food insecurity, or inadequate access to food due to lack of money and other resources, affected nearly thirteen percent of US households in 2022.[1], People experiencing poverty are more likely to experience food insecurity and are often led to purchase cheaper, less nutritious foods that increase susceptibility to and management of diet-related diseases such as diabetes.[2], Due to these factors, low-income adults experience higher rates of diabetes than the rest of the population.[3], In addition, both food insecurity and diabetes disproportionately impact communities of color. In 2021, Black and Latino/a adults were roughly two times more likely to experience both food insecurity and diabetes than white adults.[4]

Policy choices that perpetuate systemic racism contribute to the high rates of food insecurity and diabetes. These include a lack of investment in neighborhoods with predominantly Black and Latino/a communities, making these communities more likely to become food deserts where it is difficult to purchase affordable, nutritious food.[5], Administrative burdens—complexities that

prevent individuals from accessing social safety net programs—also disproportionately affect low-income communities and communities of color and further restrict access to food and nutritional benefits.[6]

Despite the acknowledged link between lack of access to nutritious foods and diabetes, there is little rigorous evidence on the impact of increasing access to high-quality, nutritious foods among low-income individuals with diabetes.

Context of the evaluation

Food-as-medicine programs include produce prescription programs and medically tailored meals. In these programs, health care providers supply or fund nutritious ingredients or meals to patients. They aim to address food insecurity and diet-related chronic diseases like diabetes.

Researchers evaluated a produce prescription program run by a large integrated health care system in the mid-Atlantic, spanning both urban and rural areas.

The program targeted individuals with type 2 diabetes, which is characterized by a patient becoming resistant to insulin (in contrast to type 1 diabetes, which is characterized by the inability to create insulin). Specifically, program participants had an HbA1c level of 8.0 or higher. HbA1c is a measure of diabetes management that measures average blood sugar levels over three months. An HbA1c level of 6.5 is considered the threshold for diabetes; with under 7.0 as a common goal for diabetes management.[7] An HbA1c level of 8.0 is therefore considered high. In addition, program participants all experienced food insecurity (determined by a two-question survey instrument), lived within the geographic reach of the program and were already affiliated with the program's health care system.

People purchasing fruits and vegetables at a farm stand

Photo: Shutterstock.com

Details of the intervention

Researchers tested the impact of the food-as-medicine program on clinical outcomes and health care utilization for patients experiencing diabetes and food insecurity across two clinic locations, one rural and one urban. Potentially eligible patients of the health care system were identified through the system's electronic health records and by physician referral. This study ultimately included approximately 500 adults, roughly 250 from each site, who were randomized to the intervention group or a waitlist comparison group. Individuals in the waitlist comparison group were informed that they would be contacted in approximately six months to schedule a program start date and were given information on the locations of local food banks. They also received their usual care, which typically included regular monitoring of blood sugar, diabetes medications, and doctor's appointments.[8]

For individuals in the intervention group, study staff immediately scheduled patients' initial program visit. Once enrolled in the program, patients received regular prescriptions for fresh food from a dietitian. The prescription, picked up at a clinic at no charge, included enough for two meals per day over five days per week for the patient and their family. Additionally, patients met with a dietitian to set and track goals; were encouraged to complete diabetes self-management trainings; were provided preventative care, such as foot exams; and were provided medication management. The program lasted indefinitely with no predetermined end date, however, typical engagement ran over one year.

Researchers measured outcomes using participant electronic health records, prescription drug orders, biometric outcomes (collected through lab work), and participant surveys. The primary outcome of interest was HbA1c levels. Other outcomes of interest included fasting glucose, weight, blood pressure, cholesterol, and triglycerides. Additionally, researchers tracked health care utilization in the form of emergency room and inpatient visits through electronic health records, paid claims, and prescription drug orders. Participant surveys asked about diet, preventive care, diabetes knowledge, barriers to healthy eating, healthy attitudes, diabetes self-efficacy, and overall health and wellbeing. Participants were compensated for completing lab work and surveys with a US$50 gift card.

Results and policy lessons

Participants in the food-as-medicine program were highly engaged with the program and reported greater improvements in diet than comparison group participants. However, there were no significant differences in biometric outcomes between intervention and comparison group patients, with both groups seeing declines in HBA1c levels.

Program engagement

The program significantly increased participants' engagement with the health care system. On average, after six months, patients in the food-as-medicine program visited the clinic more often (13 times vs. 0.7 times), had more encounters with a dietitian (2.9 times vs. 0.7 times), attended more diabetes self-management training classes (2.4 times vs. 0.4 times), and scored higher on diabetes knowledge (82.7 percent vs. 77.6 percent of correct questions) than their peers in the comparison group.

Program impacts

According to self-report measures, program participants' diets improved by 18.6 percentage points (24.1 percent) from a baseline of 77.2 percent among those in the comparison group. However, the program did not impact fasting glucose levels, weight, blood pressure, cholesterol, and triglycerides as measured in lab tests. The program also had no measurable impact on hospitalizations and emergency department visits; or on healthy attitudes, diabetes self-efficacy, or exercise and smoking.

There was no significant impact on HbC1C levels. HbA1c levels declined by approximately 1.5 percentage points after six months (from an average of 10.3 percent) among participants in both the food-as-medicine program and in the waitlist comparison group.

Policy lessons

This study demonstrates the importance of randomized evaluations, particularly when evaluating programs that focus on patients with elevated disease markers like HbA1c. While this study indicated no impact on HbA1c levels between groups, a pre-post study that only measured HbA1c levels of program participants would have suggested that the program reduced HbA1c levels. The comparison group was crucial for understanding program impacts. It is unclear why the comparison group also saw a reduction in HbA1c levels, as the researchers did not observe increased health care utilization or use of other nutrition services offered by the health care system during the study period.

One potential explanation for the finding is that, in an integrated health care system where patients are followed regularly, patients with high HbA1C levels could see improved diabetes management without an intensive food-as-medicine program. Researchers posit that the same program may have a larger impact on other populations, such as patients in a less well-integrated healthcare system or who have less connection to care. Other food-as-medicine programs, such as medically-tailored meals—which are prepared and delivered to patients' homes—may further improve adherence and therefore health outcomes. Future research on food-as-medicine programs should test whether different designs, among different populations, have a larger impact on diabetes management.

Doyle, Joseph, Marcella Alsan, Nicholas Skelley, Yutong Lu, and John Cawley. "Effect of an intensive Food-as-Medicine program on health and health care use: a randomized clinical trial." JAMA Internal Medicine 184, no. 2 (2024): 154-163.

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